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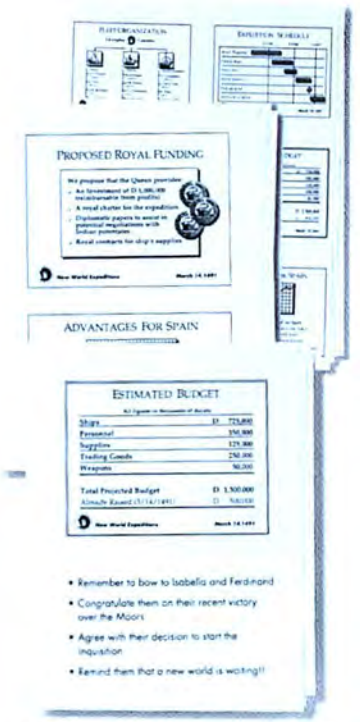
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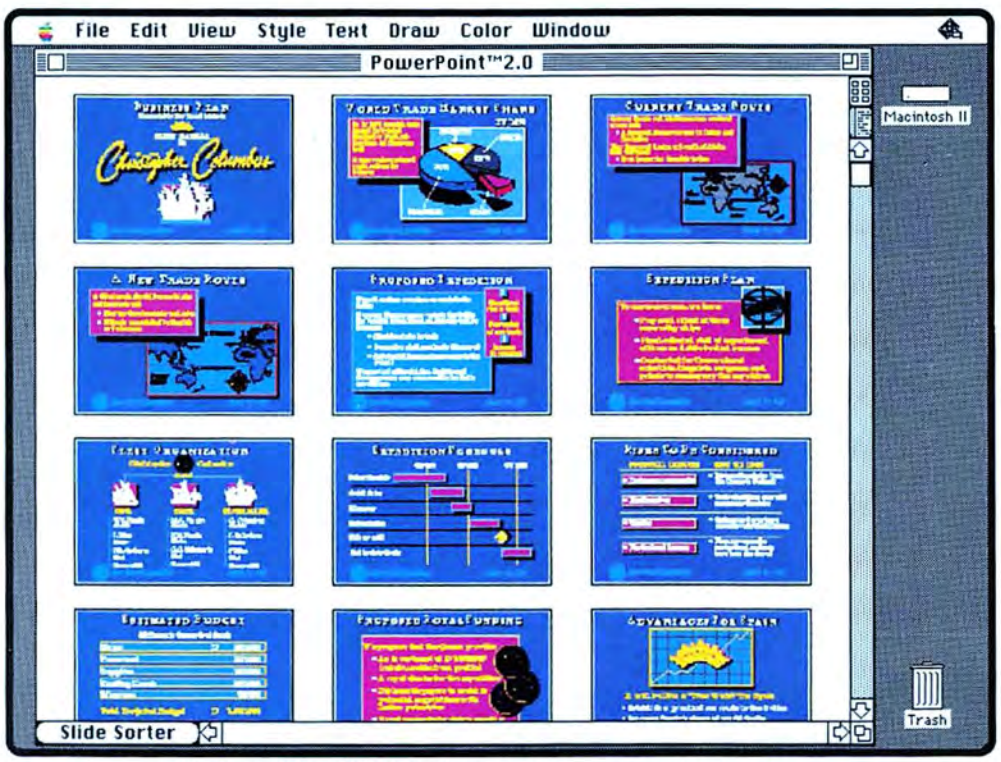
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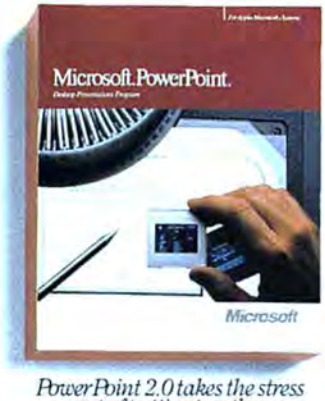
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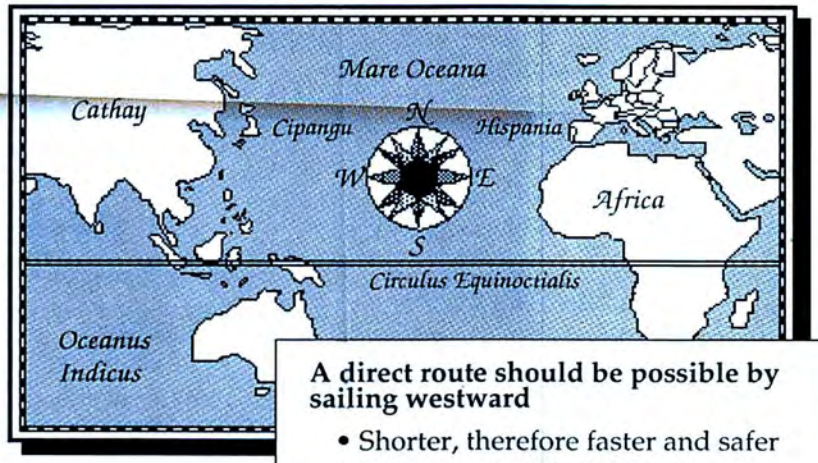


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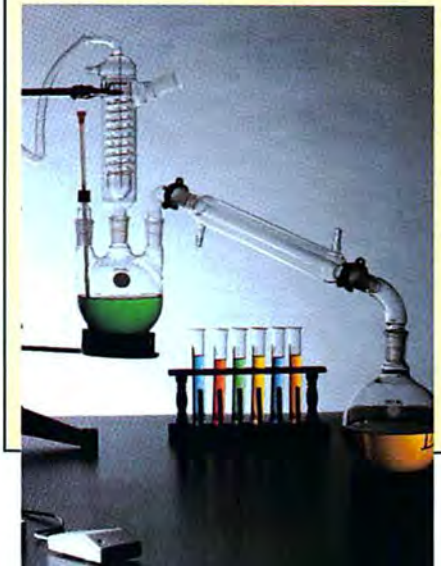
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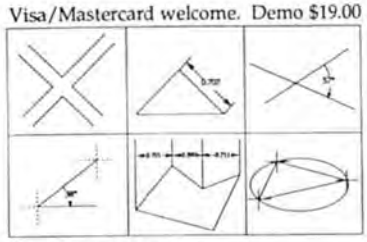


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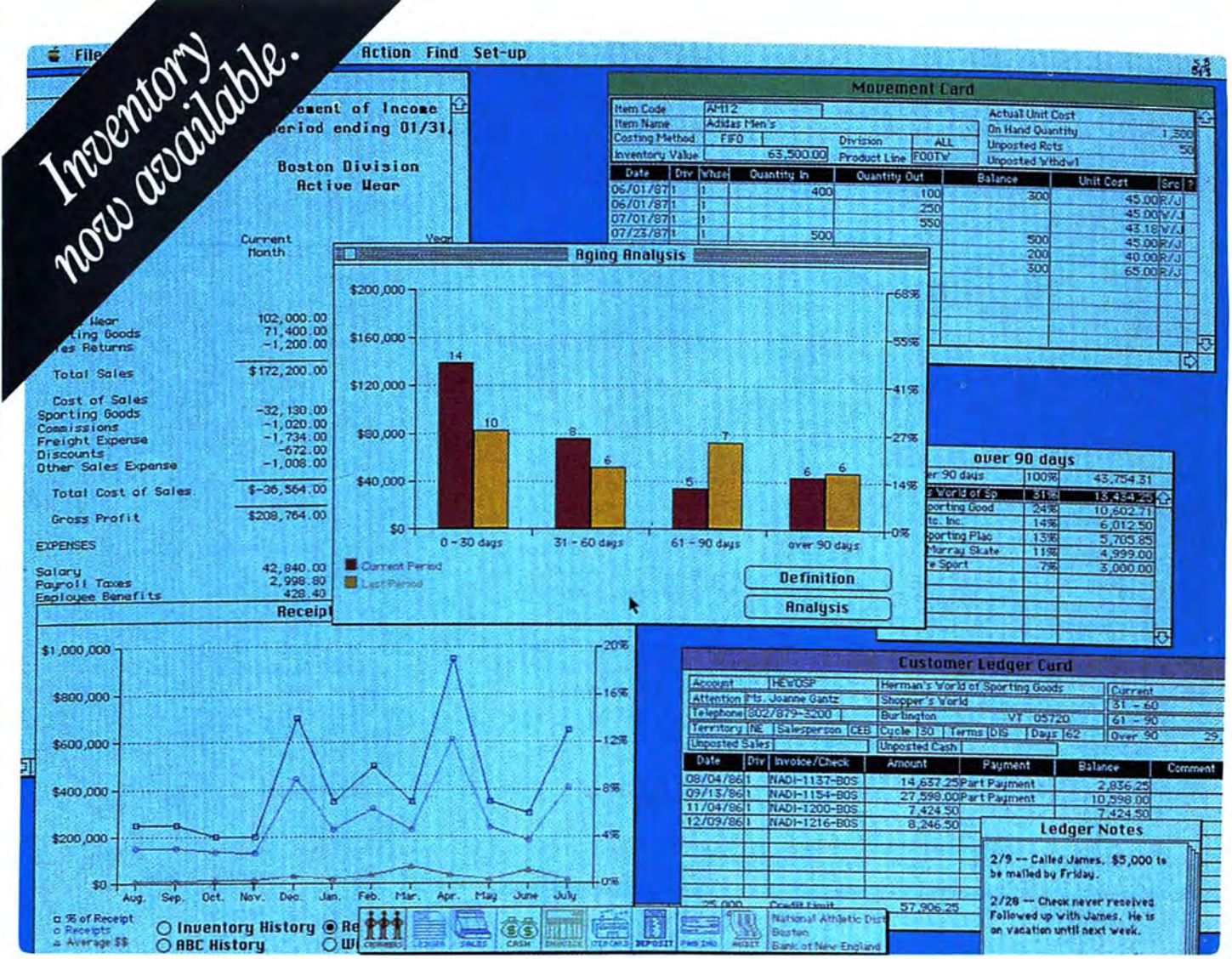
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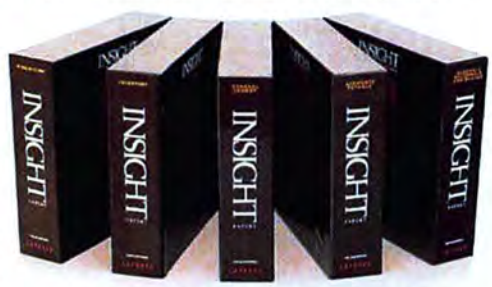
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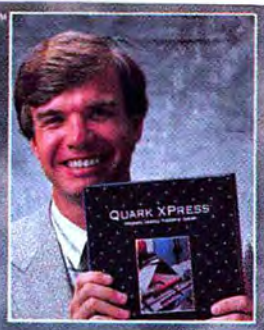
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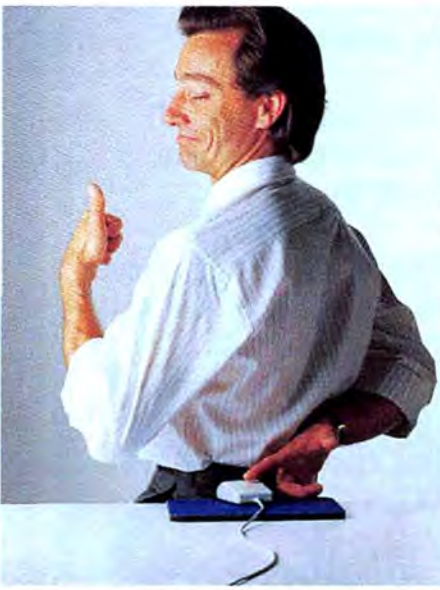
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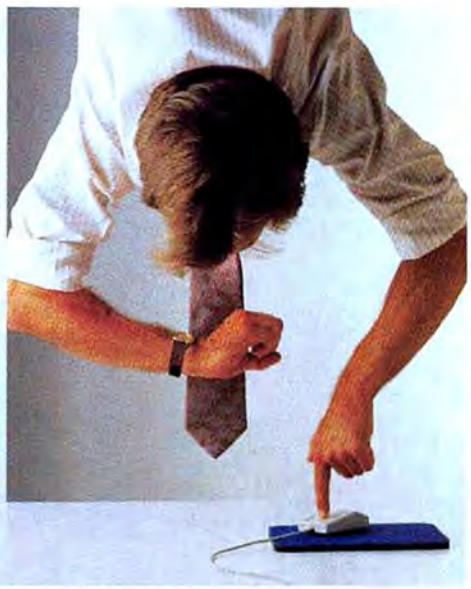
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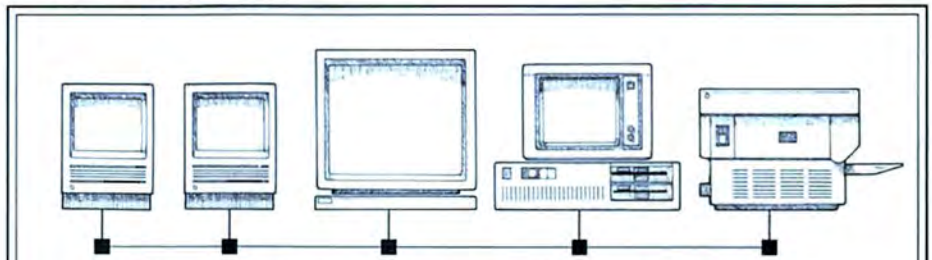
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Frank: You bet, Chet. With the lengths people are going to, I'm sure this is going to become a major international event...

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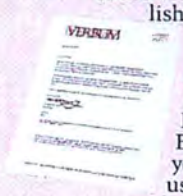
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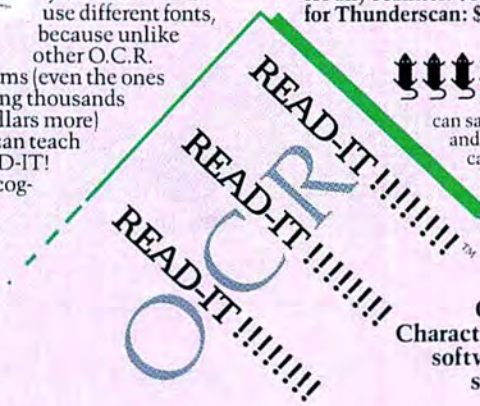
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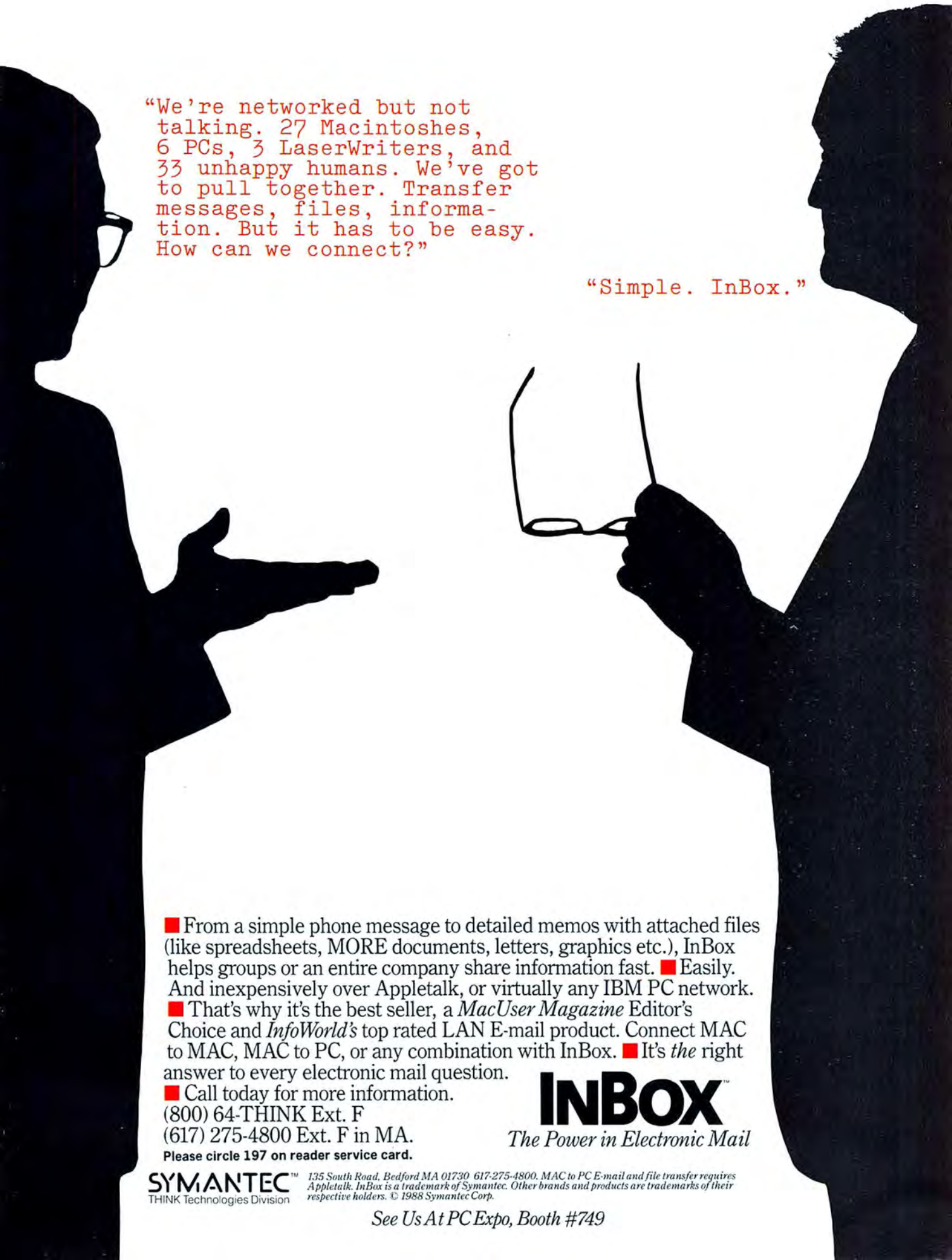
P L U S

John Dvorak on the state of the Mac. **Neil Shapiro**'s Macintosh Community. **Robert Wiggins'** Pinstripe Mac. **Steven Bobker** with The Open Window. **Jim Seymour**'s The Mainstream Mac. **Michael Swaine**'s Card Tricks. **Frederic E. Davis**' Editor's Desktop. Answers from the **Mac Team.** Three pages of hints and tips. Over 300 **Mini-Finders.** An expanded **Quick Click** section, now including hardware.

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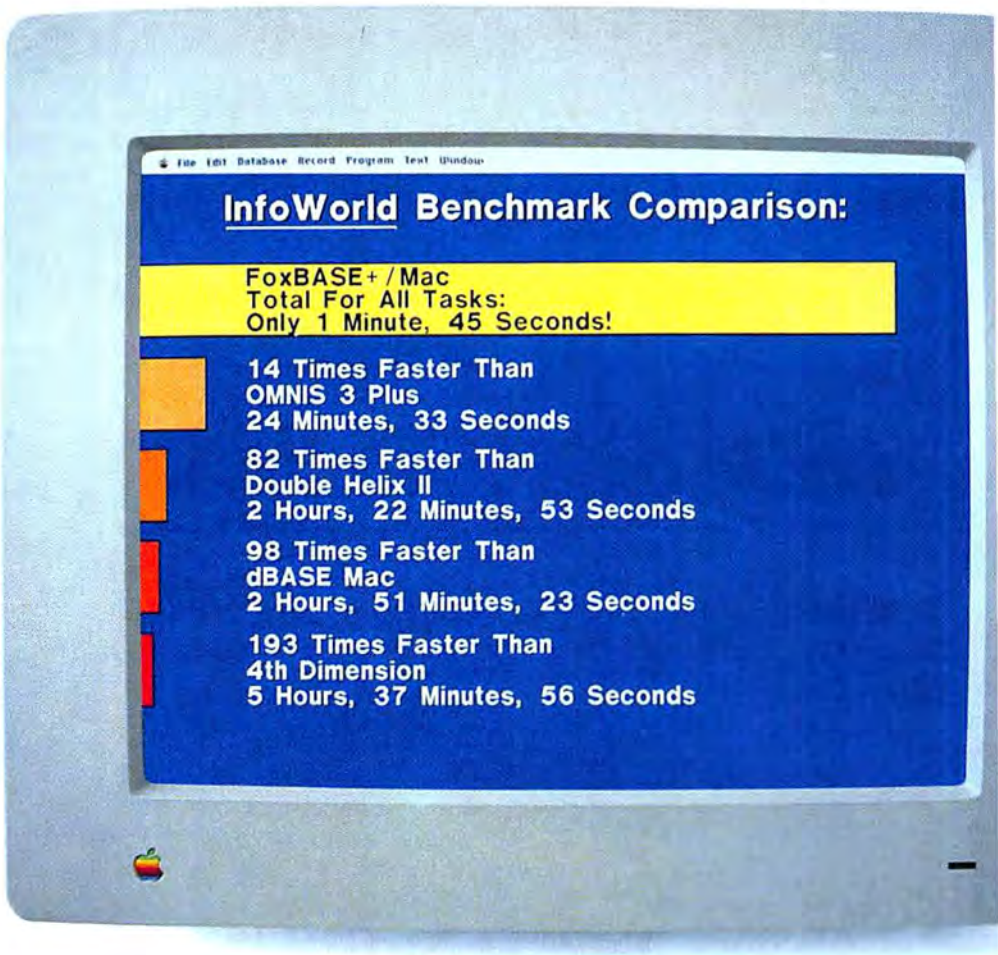
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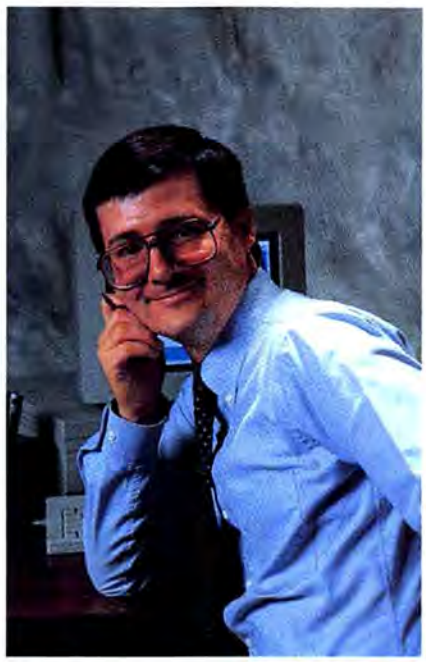
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Desktop Engineers

Desktop anything. Just fill in the blank to create your own trendy technobabble. First it was the desktop metaphor for the Macintosh's graphic user interface. Apple originally described the Mac's now-famous operating system as an electronic desktop where icons, files, and folders were moved around much as they would be on the top of a traditional desk. Next came the first of the Mac's great desktop product niches: desktop publishing. And then, after the overnight sensation of desktop publishing helped establish the Mac as a leading computer technology, the rush was on to take the word *desktop* and attach it to any other word that described some Macintosh-related product category. People both within Apple and in the outside world believed that the word *desktop* had magical marketing properties and started churning out a slew of new desktop binomials such as *desktop presentations, desktop communications,* and most recently, *desktop engineering.*

Desktop engineering, the focus of this month's issue, is a term coined by Apple to describe the growing body of Macintosh software and hardware used in the various areas of engineering. Desktop engineering serves such diverse disciplines as electrical engineering, drafting, architecture, manufacturing, and software development. Just as desktop publishing allowed you to do things with a Macintosh that could previously only be done with larger and more expensive computers, desktop engineering represents a new way to "do it for less" with a Mac.



CAD, CAM, AND CASE

Although desktop engineering encompasses many subject areas, the three primary areas on which it currently focuses in the Macintosh universe are CAD (Computer-Aided Design), CAM (Computer-Aided Manufacturing), and CASE (Computer-Aided Software Engineering). In broad terms, CAD is the electronic drafting table; CAD software allows you to design and draw almost anything, from houses and furniture to circuit boards and microchips. One of the best known CAD software programs, *VersaCad,* has recently migrated to the Macintosh and is reviewed in the article "CAD and Mouse," which appears in this issue as part of our special desktop engineering report. CAD software often works best with a pen plotter as an output device rather than a standard printer, so we've included a chart that lists 54 pen plotters that work with the Mac.

MAKING IT WITH THE MAC

CAM software helps with the manufacture of anything from table legs to computers. The Mac *EZ-CAM* package is a versatile CAM package for the Macintosh that assists you in the manufacture of various objects by allowing the Macintosh to control the operation of mills, lathes, and saws. The milling module of *EZ-CAM,* called *EZ-Mill,* is reviewed in the article "Milling Around" appearing in this issue. CAM is a subject near and dear to Apple's heart — and it practices what it preaches. Its highly automated manufacturing facilities such as the Apple factory in Fremont, California, use Macintoshes to produce Macintoshes. In addition to our features on *VersaCad* and *EZ-Mill,* we have included "Desktop Engineering," a comprehensive overview article with information on 24 CAD and CAM packages for the Macintosh.

SOFTWARE ENGINEERING

CASE is the least developed and least understood of these three engineering areas. The idea behind CASE is to try and use the computer to help create software. Now, it's true that computers are always used in the creation of software in the sense that the computer is usually used to write the software that runs on it. However, with CASE you try to get the computer to do as much of the actual programming work as possible. The ideal CASE system would ask you a series of questions about a problem or a program you'd like to create and, Presto! the computer would automatically create a flowchart, design the user interface, write the code, compile the program, and generate the technical documentation. Although we're still some ways off from that ideal system, there are some fairly innovative products beginning to surface. One innovative CASE product is *V. I. P. (Visual Interactive Programming*), which we featured as our June '87 cover story. *V. I. P.* works by using a flowchart you've created of a

program to automatically generate the program described by your flowchart. Another program with CASE potential is *HyperCard*. Although *HyperCard* needs to undergo further evolution before it becomes a true CASE system, Bill Atkinson, *HyperCard*'s creator, hopes that it will become an easy-to-use erector set for building your own programs. Our monthly "Card Tricks" column is designed to help you tap the software engineering potential of *HyperCard*.

TRICKLE-DOWN TECHNOLOGY

Engineering software is among the most complex of all computer software and has usually required large, expensive computers. Ten to 15 years ago you needed a mainframe computer that cost a million dollars or more to get good engineering software with high-resolution graphics. A lot of the original research that led to the creation of engineering software was carried out at universities and other research labs where the UNIX operating system happened to be quite popular. A few years later, engineering software migrated to smaller, less expensive and therefore more widely available systems such as the DEC VAX minicomputer that also ran the UNIX system and were typically priced in the $100,000 and up range.

> Although desktop engineering encompasses many subject areas, the three primary areas on which it currently focuses in the Macintosh universe are CAD, CAM, and CASE.

About five years ago, engineering software moved down to the so-called super-microcomputers — such as those manufactured by companies such as Sun and Apollo — which ran the requisite UNIX operating system and were considered relative bargains priced in the $20,000 to $100,000 range. The popularity of engineering software on these UNIX super-micros earned them the nickname "workstations" in reference to their use as engineering workstations. The influence the universities played in the developments of these technologies is evidenced by the emergence of UNIX as the standard operating system, and by the curious fact that the *S-U-N* in Sun Microsystems originally stood for Stanford University Network.

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The ideal CASE system would ask you a series of questions and would automatically create a flowchart, design the user interface, write code, compile the program, and generate the documentation.

duced in 1984, the engineering community took little interest in the Mac. Sure, it had a 68000 processor like the Sun and Apollo computers, but it was just a little thing in a closed box with a measly 128K of RAM. Even so, some engineers were determined to make the Mac an inexpensive engineering workstation, and after awhile the trickle-down principle of engineering software took effect and some really decent programs such as *MacDraft, MiniCAD,* and *Easy 3-D* started showing off some of the Mac's potential. Now, with the Macintosh II firmly established as a top-selling computer, and Apple's *A/UX* version of UNIX finally shipping, the trickle of engineering products is growing into a steady stream that will soon become a mighty river. Much of the software that runs on computers such as the VAX, Sun, and Apollo can now be moved over to the Mac II, thanks to *A/UX*. And from all the signs I see, the Macintosh is well on its way to becoming the computer most likely to be found on the top of an engineer's desk.

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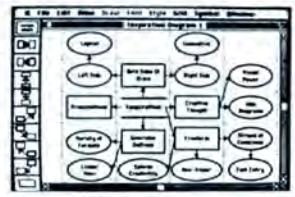


Diagram View



Outline View

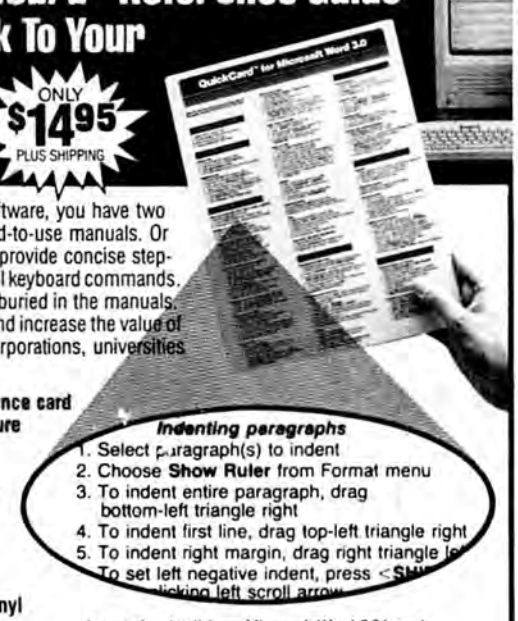
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Adam Green, Macworld, July 1987

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Andrew Gore, The Macintosh Buyer's Guide, Spring 1988

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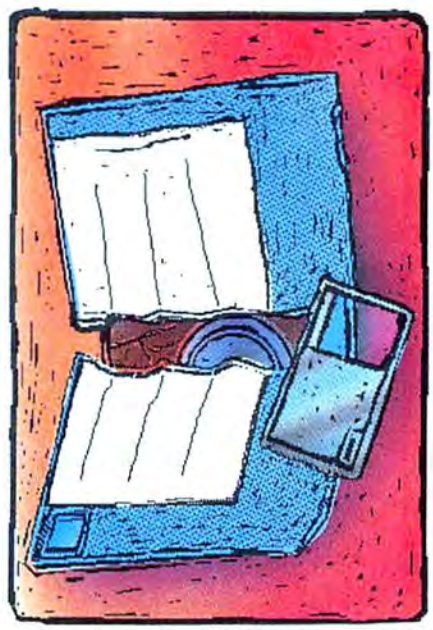
by Steven Bobker

The CD-REVolution

CD-ROM is the newest darling of the "I can't get enough memory" crowd. The sheer amount of memory this technology promises is staggering. If 20 megabytes is just a small amount of storage for you and 80 megs is, well, not enough, you're happy with the advent of the big hard disks, the 100-meg and up units that last month's "MacUser Labs Report" covered. Well, maybe happy. Even 150 megs isn't too much (or even enough) when you get right down to 50,000-record databases with indexes in many fields. And although fixed (or hard) disks are what is called *nonvolatile media*, if there is anyone reading this who has had a hard disk operational for a year or more and who hasn't had it go south at least once, please let me know. I'd like to send you a MacUser Labs T-shirt. So the prospect of a, let's say, 750-meg storage device that is truly nonvolatile is entrancing. Particularly if the price is less than the price of a good 150-meg hard disk.

Right now you can almost buy exactly that. The drives are called WORM drives — that's Write Once, Read Many times. You can record data exactly once on any portion of the disc. The next time you want to save a file, the next available unused portion of the disc is written to. And once something is there, it's there — it can't be erased. WORM discs are best suited for applications where the data is not changed or modified frequently.

WORM drives make excellent back-up devices, although the currently available drives need improved software if they are to function really well as back-up units. While they are more expensive (at least right now) than tape drives, they also offer the potential of lower costs in the long run (one removable WORM disc is much cheaper than the 10 to 25 tape cartridges it replaces). They should also be quicker, although they will not be blazingly fast. Large capacity simply does not equal fast. On a slightly more positive note, the noisiest WORM drive you'll ever hear is quieter than the quietest tape drive. (We once had a noisy tape unit that we used to call the Barbershop Quartet Singing Harmony!)



DIDIER CREMIEUX

WORM drives are nice, and you can buy one today. However, they aren't a replacement for a hard disk. To function as a hard disk replacement, you want a unit that functions just like a hard disk (keeping in mind that it will be a bit slower). Those units don't exist today, except in labs. Yes, Kodak and others have announced them and even shown demos of very small (and thus limited capacity) erasable optical drives (yet another term for these laser-read disks). But I wouldn't bet even a penny on your being able to buy one in standard CD (5.25-inch) size in the next 3 or 4 years.

Why not? Well, optical or laser disc technology has already been around in the video world for 15 years or so. Laser disc players and their attendant laser discs are more popular than VCRs and tapes in Japan. If the Japanese, the acknowledged leaders in this technology, haven't been able to create even a good demo of an erasable video disc for the huge and eager video market, there's no reason to expect one soon for the smaller (at least initially) computer market.

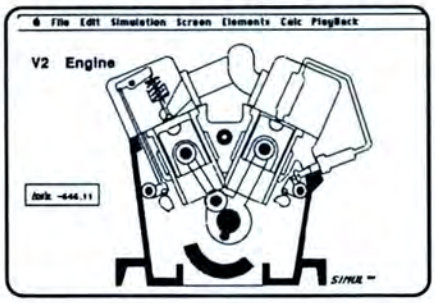
That leaves the ordinary CD-ROM (Read Only Memory), which uses players and discs similar to the CDs that have changed the recording industry in the last few years. Whatever these discs have on them when you buy them is what you get. While there are ways, using multiple levels of interlocking *HyperCard* stacks, to give the appearance of updating CD-ROM discs, these solutions are makeshift and kludgy. Right now, discs full of data are distributed and, most often, periodically replaced by new discs. The old discs are then trashed, literally.

So, right now, and for at least the next 6 months to a year, all that CD-ROM is good for is the distribution of large amounts of data. The data should be valuable enough so that the cost of periodic updates can be easily absorbed.

Digression: CD-ROM discs aren't cheap. Certainly nowhere in the range of floppy disks that can cost less than a dollar — formatted and with your material on them. The physical CD discs will cost between $5 and $20 each. The price depends on how many are made in the production run and how good a customer — of that particular disc manufacturer — you are. Since most of the early CD-ROM projects will be small runs (why make a lot if there aren't many readers out there?), they will be pricey.

What's valuable enough to justify

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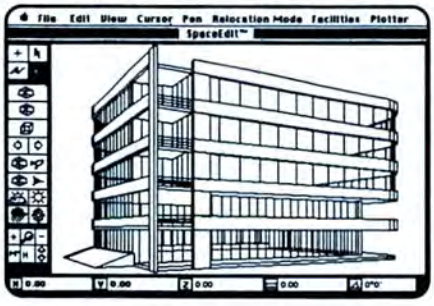


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the cost? Financial and stock data comes to mind. Indeed, that's where most of the CD-ROM product seems to be. Manuals, particularly extensive manual sets like those of major aircraft manufacturers, or Microsoft's OS/2 manuals (a 6-foot bookshelf at latest measurement), UNIX manuals (at least 7 feet so far), and even *Inside Macintosh.* There are other reasonable ways to fill up the hundreds of megabytes on each and every CD-ROM. Inventive developers will be releasing many of them during the next year. We're working on several here at *MacUser.* I'd be interested in hearing what you would find most useful on them. The only subject matter that we have ruled out for *MacUser* CDs is public domain and shareware software. Others, such as BMUG, will cover that area more than adequately. Possibilities include all reviews from all issues of *MacUser,* product compendiums (possibly hyperlinked to reviews), tips (linked to indexes and reviews), and huge art and sound files. The list is endless. What would best serve you?

How you, the user, access the hundreds of megabytes of data on each CD-ROM disc will determine how useful CD-ROM actually becomes. The program that does the accessing is called — since it must have a computer jargon name — the retrieval engine. Those that exist today are crude and barely workable. If your CD-ROM reader is hooked up to a Mac, the best engine right now is *HyperCard,* which seems to have been designed with CD-ROM at least somewhat in mind (even if the first release didn't really work with CD-ROM). It makes an adequate engine for working with relatively small numbers of items or records and its extensibility provides broad hints of the wonders to come.

That's the real revolution that CD-ROM is going to usher in. As soon as reader costs drop to the $300 to $500 range (in street, not list prices) readers will become widespread. There's no reason why that lower price can't be common very soon.

After all, very good CD music players are now in that price range (or even cheaper), and CD-ROM players can be simpler (mechanically) than the music players. The cost of writing the necessary drivers or software is the excuse most often proffered for the high CD-ROM player prices. That may be so now, but as people develop expertise in CD-ROM driver creation, that excuse will vanish. That should be very soon.

The price of Apple's own CD-ROM drive, $1199, is grossly high. Pricing it so high is a short-sighted pricing decision, possibly based on insufficient faith (or vision) on Apple's part. It appears that they want to recapture as much of their R&D expense as soon as possible. Pure foolishness. There are other drives at much lower prices already available for IBM and IBM-compatibles. Therefore, there is much more software already available for those machines. The Mac is trailing, and trailing badly, in this new technology: one in which its graphic interface should make it a natural leader. And Apple's CD-ROM reader pricing seems almost designed to keep us behind.

Fortunately, others are turning their talents to the Mac CD-ROM market and producing cheaper drives. Particularly notable is the ALOT Corporation of Scotts Valley, California. They managed to release a CD-ROM (and also a WORM drive) well before Apple did and at a much lower price to boot.

You'll be seeing and hearing a lot about and from CD-ROM in the next few years. There's no question in my mind that the technology can and will let you work with far more data, far more efficiently. And that's what computers are really all about.

Years ago magnetic tape (in cassettes and on reels) replaced punched paper tape. Then fixed and removable disks replaced tape (for the most part). Now optical media such as CD-ROMs, WORMs, and ultimately, the Read/Write optical drives will replace disks as the basic medium of choice for data. They're simply better and cheaper, and thus inevitable.

How you, the user, access the hundreds of megabytes of data on each CD-ROM will determine how useful CD-ROMs actually become.

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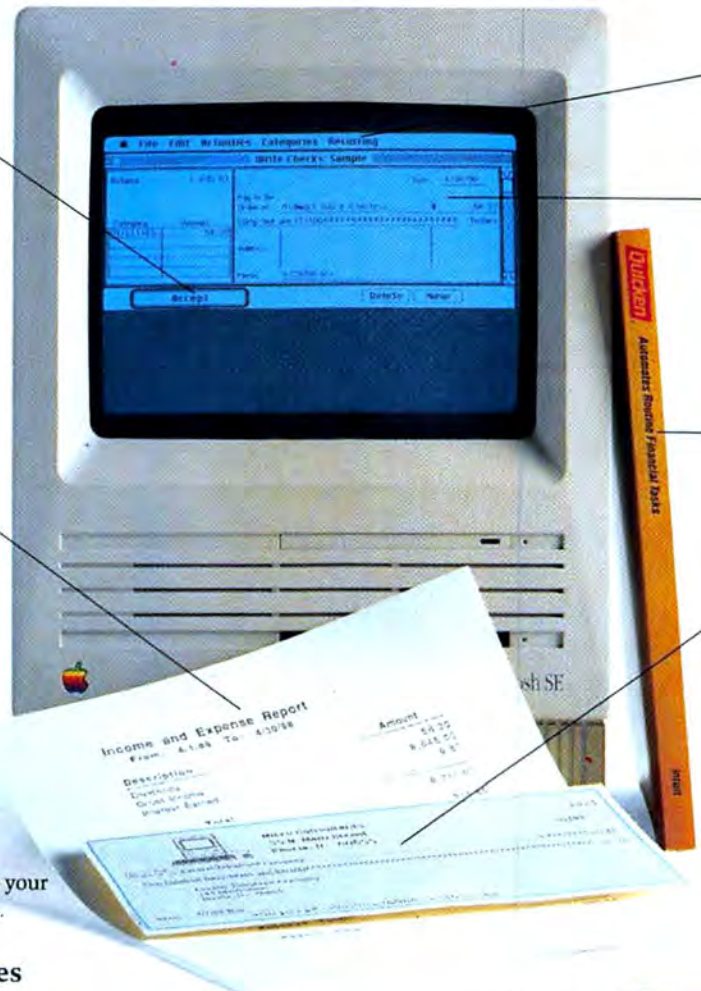
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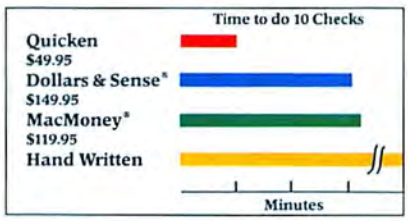
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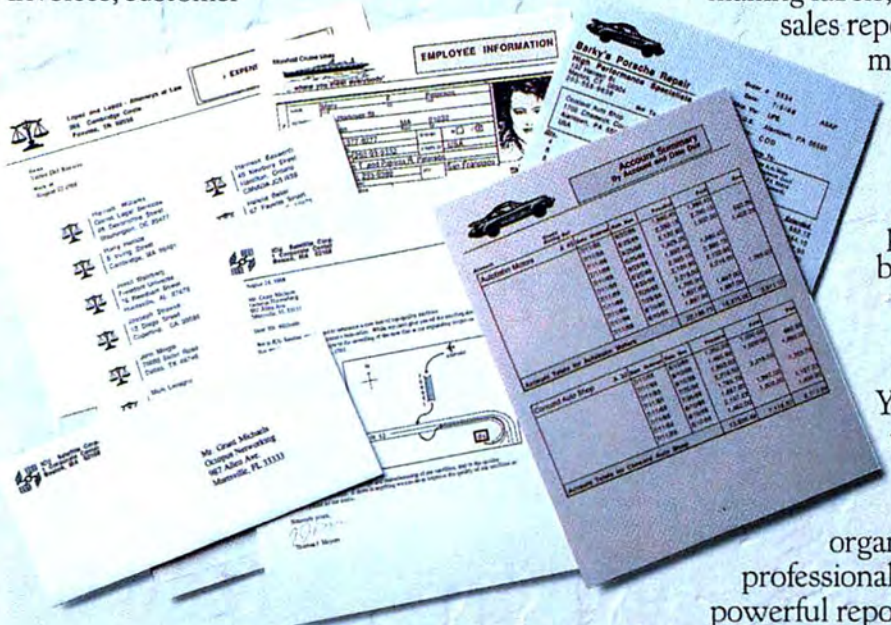
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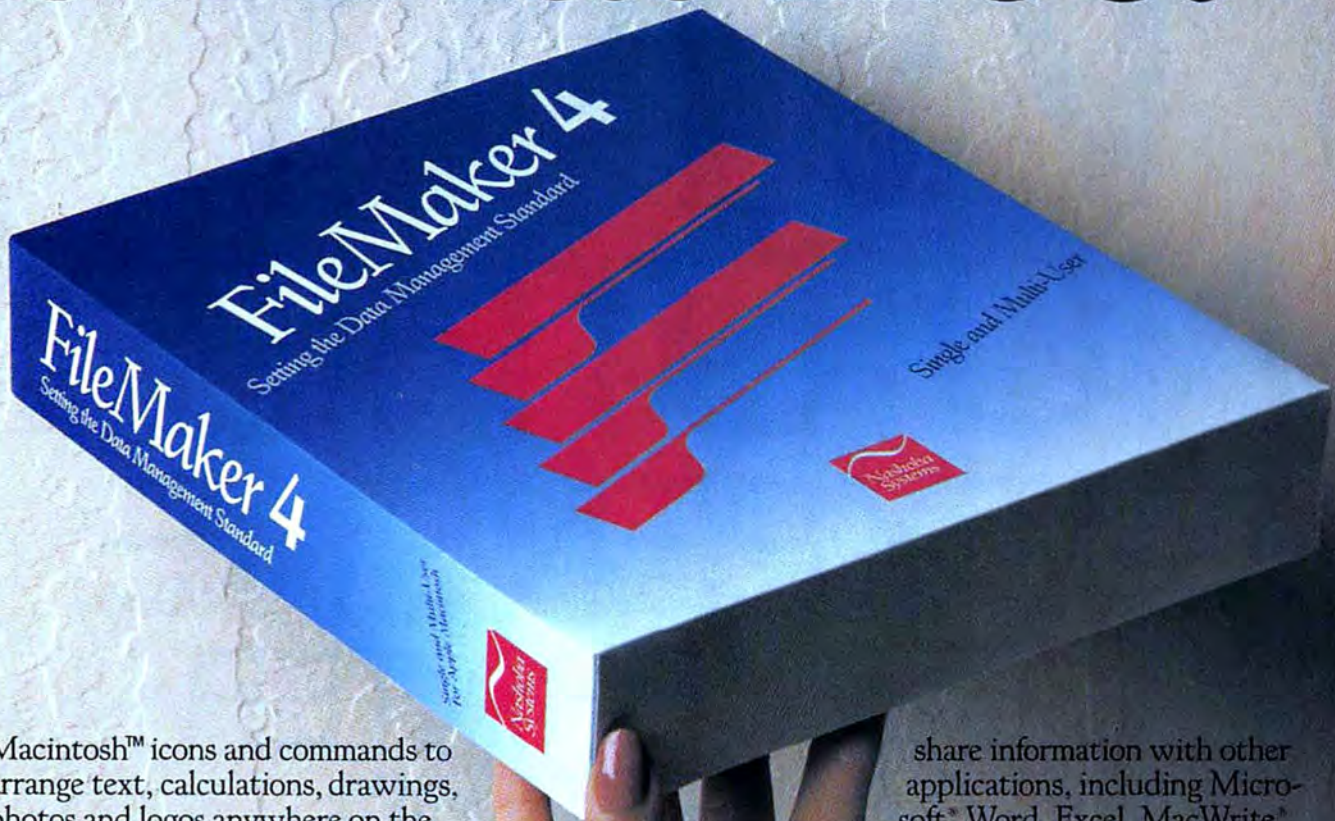


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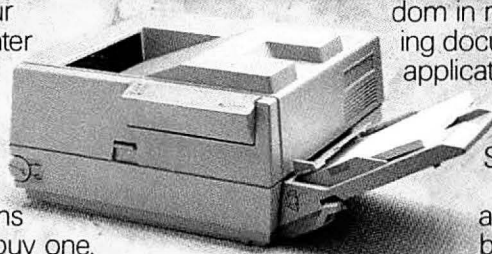
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by Neil L. Shapiro

Two-Piece Suits

As last month's column indicated, intellectual property laws are not always intuitive, nor even fair. These days, what with — as I write these words — Apple suing Microsoft over "copying" the Macintosh interface, it becomes important for all of us to give some thought to such issues. Sometimes it can help to start with a microcosmic, more specific viewpoint before trying to move to the macrocosmic, far-flung universe in which megalithic companies such as Apple must operate.

Let's start with Parker Brothers, a small (compared to Apple) company that publishes many board games that we are all familar with; games such as *Monopoly*, *Black Box*, and *Boggle*. All of these names are trademarks owned by Parker Brothers, with which they title their copyrighted games. Yet, as it happens, Parker Brothers has been very visible in "look and feel" matters since long before anyone even coined the phrase *look and feel*.

My first recollection of "look and feel" in computing was, I think, back in 1980. This was when the old, much-missed *Creative Computing* magazine published a BASIC program that would simulate the Parker Brothers *Black Box* game. In fact, this was the beginning of a contest soliciting reader entries that simulated that game. I recall that the magazine indicated that Parker Brothers had given up rights to *Black Box* or had otherwise said that the competition would be OK.

(I wish I could find the magazines in question now, but even a trip to a few large libraries could not turn them up. If anyone has these issues and can share the exact information with me, please let me know.)

This resulted in tons and tons of *Black Box* programs for the Apple II and other machines popular at that time. In fact, this trend has continued



to the present day with *Black Box* programs being among the first to show up for the Macintosh when it appeared in 1984.

A MIND-BOGGLING TALE

Then there was the game *Boggle*. The *Boggle* game suddenly began being copied for the Macintosh in various commercial programs back in 1985 and continues to be copied to the present day. Some of the commercial games even use the word "Boggle" in their on-box descriptions of what their computer games do.

At the time, my best friend was Alan Turoff, who happened to be the inventor of the *Boggle* game. I have never in my life known a more gentle soul than Alan, a person more open to ideas from others, or a person more even-handed and fair in his reactions to events. His untimely death a couple years ago was a great shock to all of his many friends and his wonderful family. He is still sorely missed.

I remember how much I, in my typical "A-personality" fashion, used to go on about how these other companies were taking advantage of him and Parker Brothers, stealing his ideas and his work. I came up with legal scenario after legal scenario in which, after only a modest court battle, he and Parker Brothers could split a gigantic pot of damages.

Alan finally visited one of the companies that were putting out *Boggle*-clones for the Macintosh. It was so typical of him that the meeting was not only cordial, it was downright friendly. He was, I recall, tremendously impressed by the programmers he met and the algorithm they had invented for putting a dictionary onto a disk.

He, obviously, had no intention of legal action. Still, I pushed, what did Parker Brothers think of the situation?

According to Alan, Parker Brothers was willing to let the issue ride because the computerized versions "contained a computer opponent." This, Alan indicated to me, meant that the electronic version was different enough from the original that prosecution might prove difficult.

Well, I didn't think too much more about Parker Brothers in the next few years until *Monopoly* games began appearing for the Macintosh and other computers.

As it happened, I had to pass on an upload of one such game to one of the computer networks. As the sysop of the group, I had to decide if it made sense for us to accept a *Monopoly* game.

ON THE BOARDWALK

Well, I tried to act within the same context, as I had understood it from Alan, and that Parker Brothers had acted within during the recent past.

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They had given away *Black Box*. They had seemingly refused to defend *Boggle*.

This particular version of *Monopoly* even had a "built-in computer opponent." We decided to keep the file. So too did other computer networks and hundreds of private BBS operators. I can't speak for the decision process anyone else went through, but I felt we were on pretty even ground, considering it all.

> Now the computer nerds have become the computer herds. If you had a dollar for every person who owned a computer you'd be well off.

So it was a shock when months later I received a cease and desist order from a Parker Brothers attorney.

It was not a chatty letter. It was one of the most threatening legal missives that I ever hope to receive. At any rate, I complied with the letter's demands, removed the game from our databases, and put up a note, taken verbatim from the letter, about how Parker Brothers owned *Monopoly*.

Then I called the attorney who had sent me the letter. I explained that I was doing an article on intellectual property. As I had thought he would, he explained to me that Parker Brothers felt strongly that the computer game's "look and feel" was so similar to the board game's that preservation of copyright demanded their actions. Also, of course, that the name *Monopoly* is a trademark.

The point in all of this is, to quote Mr. Dylan, "The times, they are a'changin'." Computers are now big business, with every big idea running the risk of suit and countersuit. Back in 1980, it probably did not make much sense to spend a lot of money to protect a game from being copied by a few computer nerds.

Now the computer nerds have become the computer herds. If you had a dollar for every person who owned a computer you'd be well off. In fact, if you had a few dollars from just a subset of that . . .

Hey, quick, it's time to call in Harvard Law!

It shouldn't come as any surprise to hear that Parker Brothers has sold the rights to *Monopoly* as a computer game to a new company for an undisclosed sum. Too darn bad the company is planning only a Commodore 64 release but, of course, they had to stomp the Mac versions, and the IBM versions, and the Atari versions, and so on in order to protect this deal. Because, in copyright matters, if you don't defend a copyright, then you risk losing that copyright.

And this brings us to Apple vs. Microsoft.

How could Apple have reacted to other companies using the "look and feel" of their windowing, trash-can'd, be-icon'd desktop?

They could have said in a Cupertino drawl, "Hey, no problem, it's yours. Enjoy yourself." I call that the "*Black Box* theory."

Or they could have huddled with their lawyers and finally issued a *Boggle*-ing statement such as: "Well, it's close but not quite close enough for us to worry over even though hardly anyone can see the difference." Or they could have gone the *Monopoly* route (pun only half-intended) and said: "Try that, pardner, and we'll sue the spats off ya." We all know which route they opted for. (If you don't, go directly to Jail. Do not pass Go. Do not collect $200.)

I think Apple made the right choice, probably the only choice. Certainly there are many gray areas involved here. No one really knows what agreement existed between Apple and Xerox PARC that developed into an ancestral, albeit crippled and half-formed, version of the Mac on the Xerox STAR computer.



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As a business — and that's what Apple is — they have to try to protect their own property and to define what is their own property in as broad terms as the circumstances will allow. To do less would be to shortchange their stockholders.

> We all know which route Apple opted for. (If you don't, go directly to Jail. Do not pass Go. Do not collect $200.)

There is a lot to be said for the idea of Apple establishing the Macintosh as the world standard in computing by making it easier for "clone" computers and staying one step ahead of the clones. But, from a purely business standpoint, why would they ever want to do such a thing?

I'm an Apple stockholder. I was lucky enough to be so enamored of the Apple logo that I bought it at $15. (Then I held it through the market crash.) If John Sculley had not fought to preserve the Macintosh interface as Apple's property I would have been at the next stockholder's meeting screaming myself hoarse — giving him the same advice I had given a friend years ago.

But still, in a better world, a more laid-back world, a less businesslike world, some Utopian dream world of Business united with the Angels and of Society Working Together . . .

Well, you know, personal computing used to be like that before the nerds turned into the herds and the dollars flew like green snowflakes in a blizzard. Next month, I'll talk about some of the ideas we all take for granted in computing these days that smart lawyers "back then" might have successfully defended as property. And how much poorer we would then all be today.

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Letters

"Grit *[the newspaper] does exist," writes an anonymous (illegible, actually) reader in Union Dale, PA, in answer to a query in our April '88 issue. "I once had a* Grit *route, got many prizes, and the country store next to me still has it on the rack along with* The New York Times *and* The Wall Street Journal*; only* Grit *has the distinction of pretending that Watergate didn't exist."*

Send your comments on other issues of interest to the Macintosh community to Letters to the Editor, MacUser, *950 Tower Lane, 18th floor, Foster City, CA 94404. All letters become the property of* MacUser *and we reserve the right to edit any letters that we print.*

ABOUT "ABOUT FACE"

Fred Davis suggests that the developers of the Macintosh interface and others in the DTP field improperly list typefaces under the heading of font in his "About Face" column in your April '88 issue. Davis' insistence on historical accuracy in his quest for proper usage overlooks the fact that there has been an evolution in the meaning of publishing terms. When technology changes, the old vocabulary is sometimes retained, but with new associations.

The term *galley* that used to refer to the three-sided tray where type was stacked just before making a galley proof became the name for the long strip of developed photosensitive paper that comes out of a photocomposer's processor. *Slug* used to refer to a single line of lead type from a linotype machine; now it refers to the label identifying a story, before the headline and credit lines are attached.

The term *font* (referring to a conjunctive category combining typeface, type size, and type style) served a useful purpose when type had to be redistributed to font trays following the completion of a printing job. But, today, the concepts font family and font series are much more important than font. To maintain consistency with the past, all the computer user has to remember is that *font* is short for *font family.*



STEVE T. BETT, PH.D.
COLUMBUS, MS

Your point that language often changes to reflect changes in technology is valid. However, the changes you cite happened long before computers or offset printing. I started on a newspaper back in the days of "hot type," when a galley was a paper proof and a slug already meant an identifying label. — LK

Mr. Davis recommends installing all versions of screen fonts, presumably as a way to access the true versions of the built-in PostScript typefaces. That is, instead of installing Times alone, you need to install Times Roman, Times Oblique, Times Bold Oblique, etc., as separate screen fonts. Third-party PostScript typefaces often come with separate screen fonts for each style, but Apple has never supplied them for the native LaserWriter fonts. Why not, if they are necessary? And where can one obtain them?

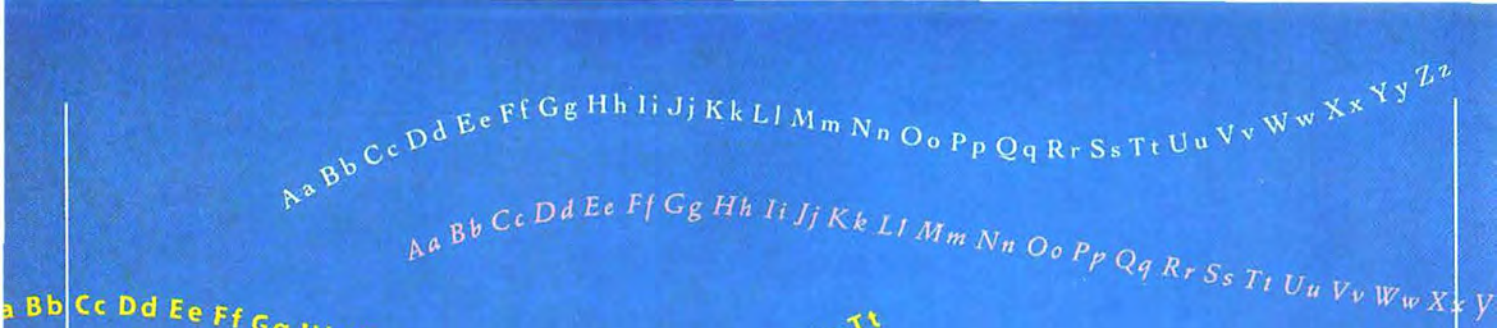
JAMES BRADLEY
CULVER CITY, CA

The full set of screen fonts is available from Adobe for $50 — which perhaps also answers the "Why not?" question. — FD

Part of the traditional artist's resistance to the use of computers is due to the misuse of traditional printing and publishing terminology, which confuses them. For example, what *SuperPaint* calls an *invert,* all artists and photoengravers call a *reverse* (converting from black on white to white on black). Invert means to turn inside out or upside down.

Another word that is overworked, misused, and abused is *graphic,* or *graphics.* During the stone age of my art school days in the '50's, the only artworks referred to as graphics were either etchings or sometimes "spot drawings," now called *clip art.* Now everything from a pie chart to a Rembrandt is called a graphic. Charts are not graphics; they are charts. Rembrandts are not graphics; they are paintings. The illustrations that accompany your articles are not graphics; they are graphic in the sense that they visually explain what the article is about, but they are still illustrations.

Last, but not least among misnomers, is *desktop publishing,* which should be called *shoestring publishing.* Publishing work has always been accomplished at desks. What the Mac-



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Letters

intosh has given to do-it-yourself publishers and art studios is more control over the finished product and the ability to present proposals that look like the finished product.

JAMES F. MARTIN
ROANOKE, VA

AD INSULT TO INJURY

Is it just me, or does somebody else find Apple's current Mac advertising campaign incredibly lame? Apple seems to think that desktop publishing is the only thing the Mac can do, and this view is easily echoed by DOS-nerds who still consider the Mac little more than a cute toy.

Why doesn't Apple set up tests between the Mac and a DOS-based computer on everyday tasks, such as formatting navigating through disks or on the Mac with a single click, compared with entering a string of commands on a DOS machine? Or show the value and fun of good desk accessories? Apple seems reluctant to talk about the very things that would sell pragmatic computer users on the Mac.

DOUGLAS KNERR
CINCINNATI, OH

You've been reading the wrong ads. Look up the infamous Claris ads that ran in The Wall Street Journal *on January 14, testing the waters with various corporate slogans for the new company. ("Claris. Not a Beatrice company." "Claris. The name above this line." "Bold. Big. Brawny. Now with the great taste of fish.")* — JZ

SPEED DEMON

Everyone talks about these new multiuser, relational Mac databases as providing more power than any other database for any personal computer. Nowhere have I ever read that the Mac world is just too *slow*. In comparing different databases, Gary Hirschberg notes (in your April '88 article "Double Helix or Nothing, Part I"), "Speed aside, the critical difference between these products lies in their approach to database design."

My secretary, on reading this article, went into gales of sick laughter. "Speed aside, speed aside!!!" There it was, two words, casually thrown into the article, almost as if they were an aside.

Even looking at turboboards for the SE, I feel that the Mac is not a true business machine. I could have saved thousands of dollars and hundreds of hours if *MacUser* had published good benchmarks on the retrieval of a single record and let people know that databases in the IBM world are hundreds of times faster.

I still love the Mac interface. But I am wiser and poorer. And Leading Edges are now humming in my office.

FOSTER W. CLINE, M.D.
EVERGREEN, CO

Keep an eye on upcoming "MacUser Labs Reports" for database benchmarks. You may be surprised. And for a monthly dose of sick laughter, your secretary might check out John Dvorak's column for the view from Big Blue. — RI

DE-LIGHTFUL, DE-LOVELY, DE-NAMED

On page 127 of the March '88 *MacUser*, I learned that *MultiFinder* was once "co-denamed Juggler." Did I simply misread that line? The possible implications of this statement inspired roughly ten minutes of hysterical laughter. By the way, which other program was also denamed Juggler?

STEVE WOOTTON
WEST LAFAYETTE, IN

Ooops. Auto-hyphens Can Be Fun. Which reminds me of some interesting tales we've been hearing about spell-checkers. A certain post-beta pre-release word processing program has a spell-checker that didn't recognize its own name, but which did accept the name of our contributing editor Wiggins as a valid word. Then there's the spell-checker that, when it comes across the corporate name IBM, proposes BOMB as a suggested alternative. We also understand that the Claris MacWrite *spell-checker suggests LaserJet for LaserWriter; it also kept systematically erasing the word* Mac *from our documents — honest. Hmmmm . . . looks like Claris will do anything to convince us that they're really independent from Apple.* — RI

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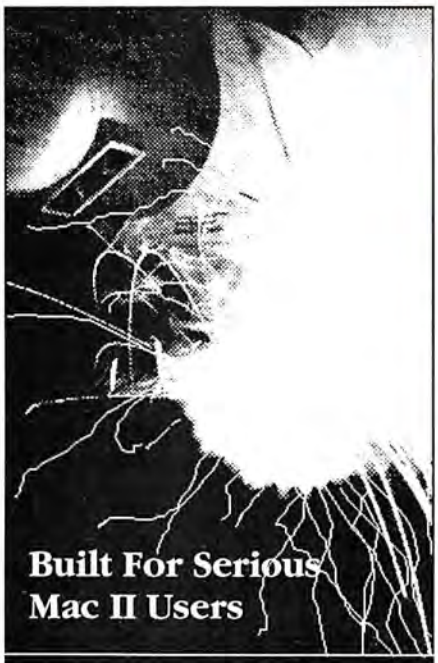
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Letters

STRATEGIC ALMS LIMITATIONS TALKS

Your editors and contributors repeatedly assail the sharing of software among friends and relatives, characterizing this activity as "theft." This idea that sharing is a form of theft is anti-social. It makes no more sense with software than complaining if I loaned a friend a copy of *MacUser* — it may cost you a sale in the short term, if my friend was predisposed to buy the issue, but in the long run, it may net you an additional subscriber.

The argument that sharing software will prevent programmers from developing software is also absurd. Good programmers are driven to create software and, like any artist, will do so whether they get paid or not.

And, given the gouging and lack of responsibility of software publishers, they have no business calling anybody names. I know of no other product category where it is normal to disclaim any responsibility for the product.

MILO B. SHIFF
BALBOA ISLAND, CA

Haven't you ever heard the phrase Actual mileage may vary *or read the fine print in an insurance policy? Disclaiming responsibility is a basic tenet of American business. And, although loaning and duplicating copyrighted materials can have similar effects, the law (and the practices that have grown up around the law) allows one and prohibits the other. Read on for another view.* — JZ

I am concerned about trends in the pricing of software utilities. Certain programs, such as *Stepping Out* (retail price, $95) and *QuicKeys* (retail price, $99.95), to name only two, appear to be setting a price standard of $100 and up for general-interest utility programs. I feel this pricing strategy penalizes the honest user, who may not be able to afford the programs. The publisher also suffers, because it encourages theft.

It is true that *Stepping Out* can substitute for a $1500 full-page monitor. And *QuicKeys* and other utilities are widely acknowledged as excellent programs. Unfortunately, there are anywhere from five to fifteen "must have" utilities, depending on the user's needs and tastes. I'm sure the software publisher could realize the same or increased profits if these products were sold for $25 or less. This would improve the supplier's reputation and increase sales of other products that might have higher profit margins.

When thousands of otherwise honest people are engaged in an illegal practice, the incentive must be pretty strong. I haven't heard of many people stealing *MacUser*, but I suspect they would if each issue cost $100 and couldn't legally be shared.

CLAYTON FULLER
DOWNEY, CA

Ever have your car stolen? With this argument, grand theft auto is the fault of car manufacturers' charging too much for their product. The involvement of a large number of people in an illegal practice doesn't make it legal. — LK

This morning I received a floppy in the mail with the following letter from Rick Chapman and Andy Scheck of Boojum Computer Systems:

"Thank you for sending in your $10 license fee for the SORT and FIND external commands. We had developed them for our own use and really weren't looking to profit from them. Still, the additional documentation and upkeep required to distribute these routines did justify, in our minds, charging a small fee for their use. It seemed to us that if we made $100 to $200 off of the routines, we could then justify the effort to document and promulgate other externals we've written.

Unfortunately, you are one of only two people so far that have sent in their license fee, even though over 300 have downloaded our routines from GEnie alone! We have been so discouraged by the response that we will probably not release any of our other routines."

Now folks, I know that Rick and Andy's SORT and FIND XFCN wasn't perfect, but it was a heckuva lot faster than trying to write an in-field SORT in HyperTalk. I'm sure that *many* of the hundreds of people that downloaded it found a use for it. This letter made it clear to me just how badly most users

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Letters

have failed to play by the rules of the shareware system.

I'm curious about the other person who paid her or his dues. The idea that the two of us belong to some special little group is disheartening. I'd much prefer to be one of many.

TERRY HARPOLD
PHILADELPHIA, PA

I know what you mean. I still haven't tracked down the other guy who voted for McGovern or the other member of the Coleco Adam user group. — JZ

STOP MAKING CENTS

Could you please share more details on the strategic planning software hinted at in the March '88 Rumor Manager column? I have enclosed a stamped envelope for your reply (and a nickel, just in case stamp prices go up).

J. WESLEY WYNENS
ATLANTA, GA

The Rumor Manager's lips are sealed. But keep an eye out for Crystal Ball *from Market Engineering, due out in July — it looks promising. And even though postal rates did go up, we're returning your nickel — the heads-or-tails approach is still the most tried and true strategic planning technique.* — KC

A LAMEBRAIN DEFENSE

Fred Davis opines (in his April '88 WYSIWYG column) that the greatest problem with the Apple LaserWriter II SC is its lack of PostScript, which, he says, prevents the SC from taking advantage of the output of *Illustrator*, *Cricket Draw*, *FreeHand*, or *Fontographer*.

The SC's lack of PostScript can actually be an advantage, not a handicap, in a moderate resolution printer. It prints faster, especially with graphics, since the Mac doesn't have to waste time converting everything to PostScript, just to have the printer waste time reconverting it back to a raster image.

Davis is incorrect in stating that *FreeHand* will not be usable with the SC. A largely unrecognized feature of *FreeHand* is its powerful support of QuickDraw as well as PostScript. Considering Apple's commitment to QuickDraw, the direct PostScript output of such programs as *Cricket Draw* and *Illustrator* will become a liability. Naturally, graphic images saved as pure PostScript will not print on the SC, but Encapsulated PostScript Format contains a low-resolution bit-map image that will print. Object-oriented Draw or PICT graphics print every bit as well on the SCs as on other LaserWriters. And the popular high-resolution TIFF files generated by scanners do too, only noticeably faster.

And the "lamebrain" SC hasn't had a "lobotomy," as Davis claims — it has 1024K of RAM and a Motorola 68000 processor just like the NT. Perhaps the greatest handicap of the SC is the scarcity of appropriate quality typefaces. Apple seems to have missed the boat in not realizing the need for QuickDraw outline fonts, although several third-party suppliers are busy generating new bit-map fonts to fill the gap.

DOUGLAS G. MILES
ELLENSBURG, WA

My comments on the SC were in the context of a DTP column. For other applications, the SC (along with the less expensive ImageWriter II and ImageWriter LQ, as well as General Computer's non-PostScript Personal LaserPrinter, reviewed in our April '88 issue) is worth a look. The lobotomy in question referred to the lack of PostScript and networkability. (The 68000 processor only supports the "lower brain" function of directing raster output to the printer.) Without PostScript, printer output is no longer device-independent. That means you can't use the SC as a proofing device for final publication-quality output on a PostScript typesetting machine.

For DTP applications, spending a little extra up front for PostScript will usually pay off in the long run. You're right about FreeHand's *compatibility with QuickDraw, although Apple's "commitment to QuickDraw" is a subject of much debate down in Cupertino.* — FD

SKEPTIC TANK

Jon Zilber's April '88 review of *Handwriting Analyst* concludes

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Letters

with a golly gee-whiz endorsement of a practice that is, at best, unproven and, at worst, dangerous. Do we really want a society in which employers routinely use computers to analyze our handwriting to determine who gets hired, fired, or promoted?

Graphology may be a budding proto-science or it may be just another pseudo-science draping itself in the cloak of scientific respectability while refusing to examine itself by the standards of science. A central tenet of the scientific method is falsifiability. Before I allow myself to be persuaded that graphology is valid, I want to see its practitioners define standards and benchmarks by which we can at least attempt to gauge its validity.

My skeptical instincts will allow me to assume the latter until its practitioners take the trouble to convince me of the former.

JAY HENDON
FAIR OAKS, CA

I'm about as skeptical as they come (a card-carrying subscriber to The Skeptical Inquirer, *no less). Science requires only that theories be proved, not tools. The impressive performance of the program doesn't prove or disprove any particular theory of graphology, but it did convince me that* Handwriting Analyst *is a useful tool.* — JZ



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THE E'S HAVE IT

I am t¿rribly sorry to hav¿ to troubl¿ you with so many unsolicit¿d and, I am sur¿, annoying l¿tt¿rs within so short a tim¿. I am at my wit's ¿nd and ¿v¿ry day th¿r¿ is a n¿w probl¿m to cont¿nd with. Just wh¿n I thought I could liv¿ with th¿ doubl¿ ¿'s, a t¿rribl¿ n¿w trick has b¿¿n play¿d on m¿. I gu¿ss I don't hav¿ to ¿xplain what it is, as you can s¿¿ p¿rf¿ctly w¿ll from this l¿tt¿r. ¿v¿rything I typ¿ turns out this way. I am afraid I will hav¿ to r¿sort to pap¿r and p¿ncil to g¿t any work don¿.

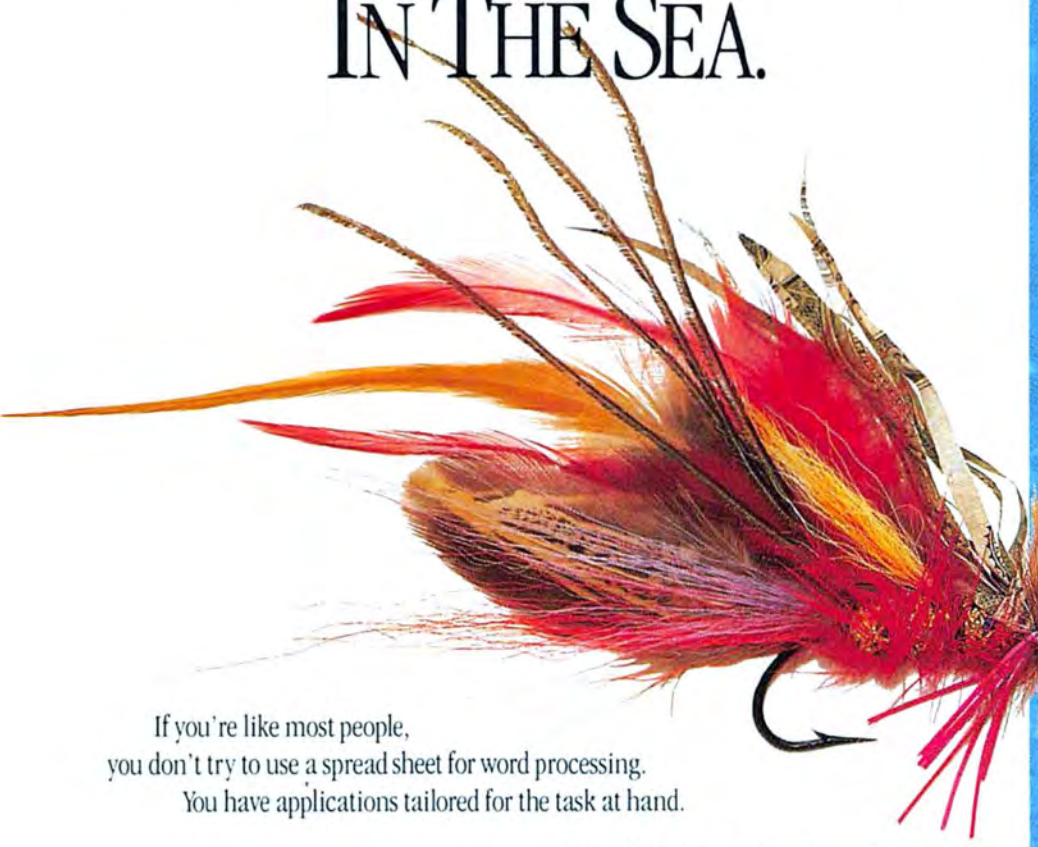
I am alarm¿d and distraught. Pl¿as¿ h¿lp m¿.

Ow¿N ¿. D¿LL
SANTA BARBARA, CA

In addition to the above letter and two related ones in this month's "Help Folder," we regret to say we received a fourth and final letter from Ow¿n — er, Owen, in which he notes that, at the advice of his therapist, he has "donated his Mac to the local home for the criminally insane and purchased two boxes of Ticonderoga No. 2's and a twelve-pack of yellow legal pads at Stationery 'N Stuff" for himself. It may be too late, but Owen may want to check out Sal Parascandolo's article "Chairman of the Keyboard" in our June '88 issue, which will have him singing in the key of E in no time. — JZ

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The Big Picture CX showing color CAD drawings.



The Big Picture with Double Feature software displaying word processing and spreadsheet.



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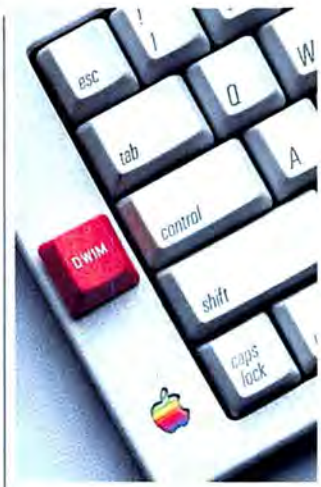
EDITED BY JON ZILBER

Fractured Fairey Tales



Over the years, the West Coast Computer Faire has evolved from a hacker hotbed to a retailer rally. The only major revelation at this year's fair (held in April in San Francisco) was Autodesk's acquisition of hypertext guru Ted Nelson's Xanadu project. Xanadu, twenty years in the making thus-far, is an ambitious universal multimedia data structure, expected to be available for the Mac II — as well as Sun and PC workstations — by the end of 1989. (At a press conference, Nelson joked that Xanadu would become the first member of the exclusive Golden Vaporware Club — whose other members include the infamous Dynabook and Architecture Machine projects — to graduate into the marketplace.)

At the Faire gates, a group of die-hard hackers, determined to keep the spirit of share and shareware alike alive, were handing out free "Keep Your Lawyers Off My Computer" buttons. But just about everywhere else at the Faire, deep discount madness reigned supreme. At shows like these, the fun stuff is all in the Off-Off-Broadway low-budget booths near the walls, where marked-down software shares floor space with half-price gold chains, guaranteed-authentic Seiko watches, and PC jr. user groups (I looked in vain for the Coleco Adam user group). Down one aisle, a bottomless cup of coffee poured over a keyboard shielded by a transparent SafeSkin cover ($22.95 to $27.95) that protects your keyboard while you type. (From SafeSkin, P.O. Box 1002, Centerville, UT 84014; (801) 295-7739.) Another vendor was hawking a glass cleaner and anti-fogger cream. What were they doing at a computer show? Maybe they figure all hackers wear glasses, or that some Mac addicts are so attached that they bring their machines into the shower with them.



Across the floor, APS (26020 Auberry Road, Clovis, CA 93612; (800) 544-9264) was pitching an add-on DWIM (Do What I Mean) key. It's sort of a pet rock for your computer keyboard; once installed, it creates a direct mind-to-Mac interface, but only if you believe it does. The DWIM price list optimistically lists the price-per-DWIM for orders of 100,000 units ($1.08). Sure, laugh if you want to, but don't forget that they laughed when a couple of kids named Steve roamed the Faire pitching their own silly ideas. Who knows? A few years from now you could be reading *DWIMUser*.

— *Jon Zilber*



Upward-ly Mobile

The humble staffers at *MacUser* are moving up in the world — up 16 floors and over about half a mile. (Actually, it's easier if you go over first, and *then* up.) We promise: This is the last time you'll have to update the *MacUser* entry in your address book for at least a month.

Send letters to Dialog Herb, Bugsy, The Tip Sheet, The Help Folder, Flash Cards, the Update Manager, MacUser Labs, and the editorial staff to *MacUser*, 950 Tower Lane, 18th floor, Foster City, CA 94404; (415) 378-5600. Our advertising and design staffs can also be reached at that address. Send questions about your subscription to Ziff-Davis *MacUser* Circulation, One Park Avenue, New York, NY 10016.

If you have problems with one of our advertisers, contact that company directly; we regret that we can't always respond individually to consumer complaints.

— *Jon Zilber*

Seize the Data!

Until now, researchers using IEEE instruments or peripherals with a Mac II have had to spend nearly as much time quitting and launching as collecting data, because the available interfaces couldn't be accessed from within an application. For all those aggravated lab-coaters out there, IOtech has introduced the MacII488, an IEEE 488 interface for the Mac II that can function as a desk accessory.

The MacII488 is an interface card that slips into one of the Mac II's open slots and provides the user with programmability, data transfers at up to 600K per second, and direct connection to IEEE instruments and devices using standard IEEE cables (without adapters). Up to 14 such gadgets can be chained to the MacII488, although only one of them can be actively collecting data at a time.

To get the most out of their product, IOtech includes two programs, *MacDA488* and *MacDriver488*. *MacDA488* lets the user access his or her data without quitting his current application. The collected data is stored

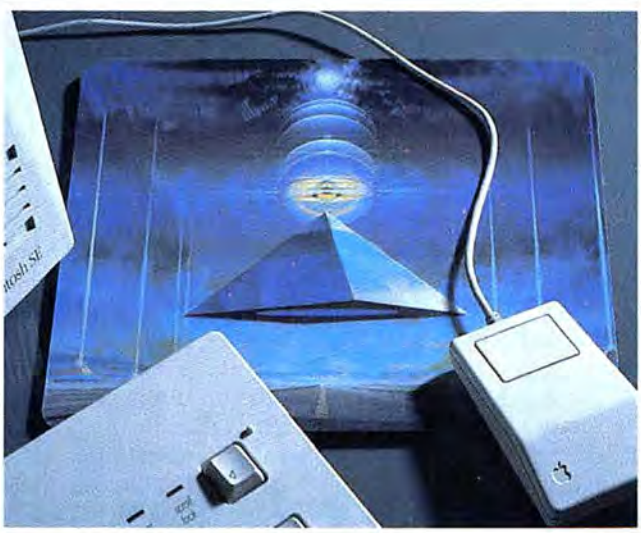
WALTER JEBE II



on the Clipboard, but for experimenters gathering more data than the 64K allowed on the Clipboard, the MacII488 can also be programmed to write directly to RAM (a nice solution, provided you can get the SIMMs). *MacDriver488* is an installable driver that provides IEEE control for such languages as *MS-BASIC* 3.0, *MPW Pascal*, *Turbo Pascal*, *MPW C*, *Lightspeed C*, HyperTalk, and many others. Both *MacDA488* and *MacDriver488* use Hewlett-Packard-style bus commands and syntax in programming the MacII488.

The MacII488, including *MacDA488* and *MacDriver488*, is available from IOtech for $595. For ordering information, contact IOtech at 25971 Cannon Road, Cleveland, OH 44146; (216) 439-4091.

— Russell Ito



Invite your mouse over to our pad. Publishing Ink, purveyors of computer novelties, is now in the designer mousepad business. The artwork, which ranges from a spaceman to a tsunami to an illuminati-type pyramid, was created on a Macintosh. Prices range from $14.95 for a small pad to $17.95 for a large one. Publishing Ink, 521 State St., Glendale, CA 91203; (818) 500-7857.

Red Squares

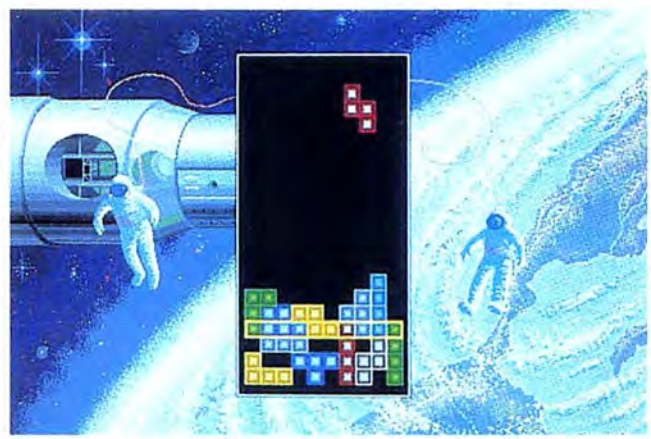
It seems that *glasnost* works on the micro level, too. That's not a reference to Marxian economics. Rather, the Russians are exchanging computer games in addition to other cultural offerings. *Tetris*, the first commercial program from the Soviet Union to reach the West, is being hailed as "the Rubik's Cube of software."

Tetris requires players to match up squares into a solid horizontal line as they descend from the top of the screen. Like all good eye-hand coordination games, the tempo increases as you progress. Each new screen has a different background, including views of Gorky Park and Red Square. The Mac version of *Tetris* will be marketed by Spectrum HoloByte (2061 Challenger Drive, Alameda, CA 94501; (415) 522-3584).

— Ben Templin



***Glasnost* works in mysterious ways, comrades. *Tetris*, distributed by Spectrum HoloByte, is the first software émigré from the Soviet Union. (The perfect gift idea for anyone who thinks Karl was the funniest of the Marx brothers!)**



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NEWS LINE!

Software Supply and Demand

MOUNTAIN VIEW, CA — Steve Brecher, owner of Software Supply and creator of *Suitcase* and *Power Station,* has announced that these two programs will be published by **Fifth Generation**, a Baton Rouge, Louisiana-based software company. Brecher will continue to upgrade both programs and to provide technical support for them over the CompuServe network. Fifth Generation, publishers of *FastBack* will handle all marketing and sales for the products.

Software Shuffle

FOSTER CITY, CA — Another product expected to change hands shortly is *Ragtime,* an integrated page-layout and spreadsheet package. The product had been distributed by **Orange Micro** which, at press time, was negotiating with **Nashoba Systems** over the sale of *Ragtime.*

Structural Shuffle

CUPERTINO, CA — **Apple Computer** announced several organizational changes in April. Apple reorganized its sales and marketing forces into three divisions (Apple USA, Apple Europe, and Apple Pacific) and announced its first overseas research and development center in its European headquarters in Paris. Apple also outlined plans for a fee-based End User Services group to help the company compete in multi-vendor environments.

Suit Du Jour

SAN JOSE, CA — In response to **Apple**'s lawsuit seeking an injunction against the sale of **Microsoft**'s *Windows* version 2.03, Microsoft has filed a countersuit charging Apple with breach of contract and accusing Apple of unfair trade practices. Apple had licensed aspects of the Macintosh interface to Microsoft for use in *Windows,* a program that creates an operating environment on MS-DOS computers that features many of the windowing and iconic aspects of the Macintosh. Microsoft maintains that the terms of the original license apply to *Windows* 2.03. **Hewlett-Packard**, whose *New Wave* software runs under *Windows*, was also named in Apple's original suit; H-P had not filed a countersuit at press time.

Thin Bits

. . . **Autodesk's** *AutoCAD* is coming to a Mac II near you. Watch for the $3000 3-D CAD program this fall. (MS-DOS users can switch platforms as part of the version 10.0 upgrade.) **Target Software**, publishers of the *Scoop* page-layout program, has disconnected its telephones and is widely reported to be undergoing a major restructuring . . .Now Shipping: *FoxBASE+/Mac*, a fast database management program from **Fox Software**, compatible with *FoxBASE+* and *dBase III Plus* on MS-DOS computers; *SoftPC,* a software-only IBM PC emulation program from **Insignia Solutions** (which ships on six 800K diskettes); *WordPerfect,* from **WordPerfect**, the long-awaited word processor (although there seem to be two — and possibly three — versions of version 1.0). Joe Isuzu Department; **Ashton-Tate** has shipped *FullWrite Professional.* Really.

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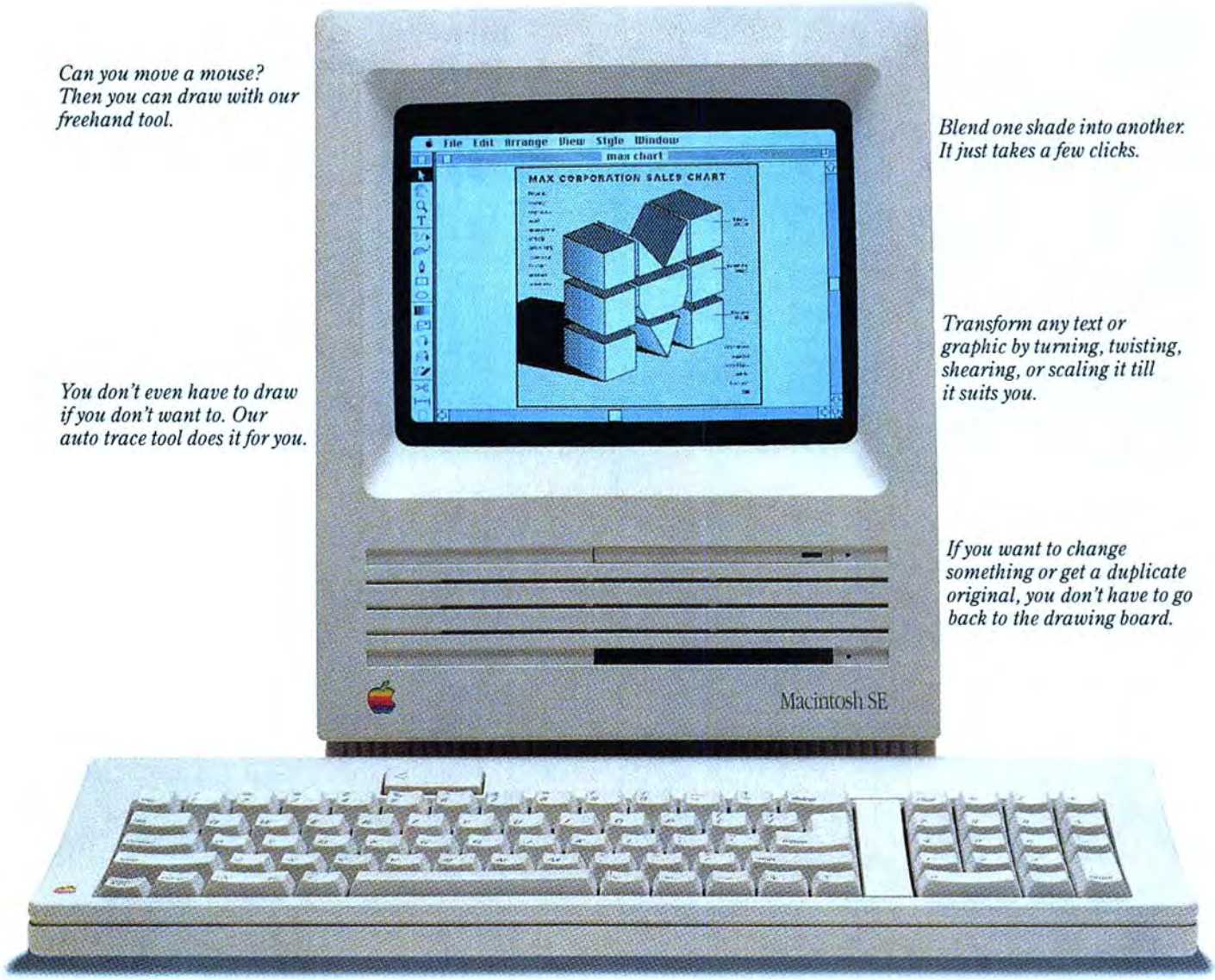
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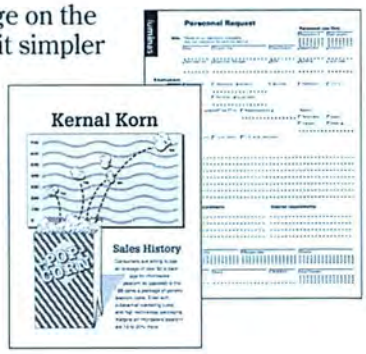
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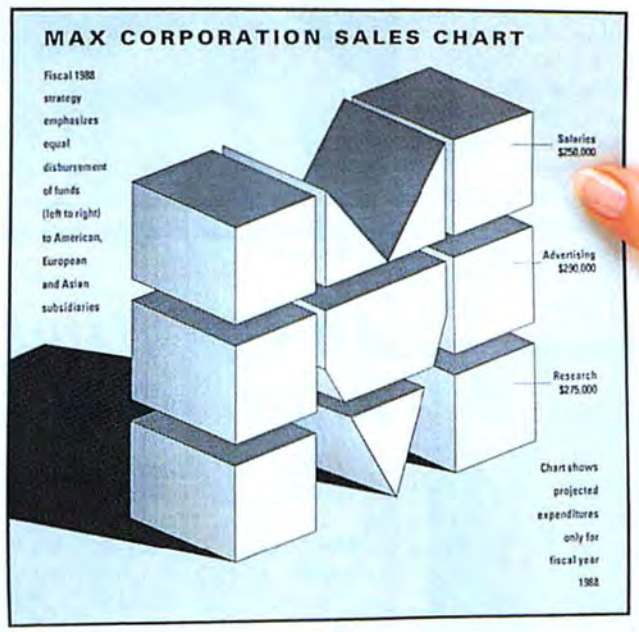
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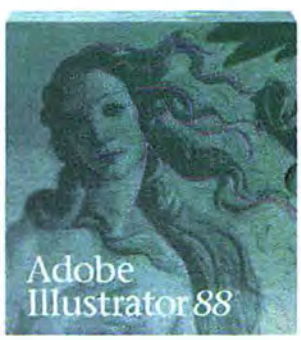


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Municipal Meanderings

Your horoscope predicts travel in the near future. You're planning a vacation, or perhaps a business trip. *City to City* can make the planning stages easier and leave more time for enjoyment.

Activision, one of the first companies to produce commercial *HyperCard* stacks, brought out *Business Class*, an overseas travel database last year. They've brought the same concept home with *City to City*, which turns your Mac into a travel planner for trips throughout the United States.

City to City is your tour guide to business and recreational information for over 30 of the most popular destinations in America, offering access to 12 categories of information, including lodging, sports, theater, transportation, and (ladies!) shopping. It contains 10,000 entries and 7500 phone numbers, and can be linked to *Business Class*.

Personal profiles keep track of customized travel information, such as frequent flyer and rental car numbers, airline flights, and hotel reservations. You can make reservations through *City to City*'s telephone interface that connects instantly with any of the 7500 numbers; print your itinerary and you're on your way!

City to City lists for $49.95. For more information, contact Activision, P.O. Box 7287, Mountain View, CA 94039; (415) 960-0518.

— Laura Johnson





Kensington's SuperBase raises the standard for Mac desktops — by about 4 inches.

An Uplifting Experience

Kensington takes the Macintosh to a higher level. Literally. With Kensington's SuperBase, your Mac SE or Mac Plus can look you straight in the eye as you work. This sturdy aluminum base elevates your Mac 4 inches. The SuperBase also comes with a tilt/swivel top that lets you tilt your Mac up to 17 degrees and rotate it 360 degrees.

But wait, there's more! It also comes with a shelf for a second drive. Even better, it's easy to install. Just place the feet of your Mac through the four holes on the top, and you're set.

SuperBase is available nationwide from computer dealers for $49.95. For more information, contact Kensington at 251 Park Avenue South, New York, NY 10010; (800) 535-4242.

—Kristi Coale



A Touch of Class

Learn the ABC's of *4D* while you sleep? Teach yourself page-layout software in 92 easy steps? Easier said than done when you're talking about powerhouse software like *Excel*, *4th Dimension*, or *PageMaker*. Tutorland offers some hope with its new *Teach Yourself* series. Using soothing, encouraging instructions equalled only by *Sunset* magazine or Mister Rogers, these tutorials take the user step by step through the commands and applications of the programs.

For example, in the *Excel* tutorial, the user will start with an introduction to the basic spreadsheet format and continue with statistical calculations and on to data management.



Each $69.95 book comes with a practice disk. (The parent software is needed to run the *Excel* and *PageMaker* exercises.) Tutorland can be reached at P.O. Box 160429, Cupertino, CA 95016; (408) 973-0472.

— Kristi Coale

Strings Attached

If two performers are a duo and three are a trio, what do you call a collection of 51 strings? You call it *String Quartet* 1.0, the latest disk of new instruments for *Studio Session* from Bogas Productions. In addition to timbres for every orchestral range, the disk includes the sounds of silence (for those tricky John Cage passages) and pizzicato, and a dozen demonstration songs to show off your new strings. The disk sells for $20, from Bogas Productions, 1520 Pacific Avenue, San Francisco, CA 94109; (415) 673-2532. (Buy two and challenge the 101 Living Strings to a showdown!)

— Jon Zilber

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Bright Star Technology – **Alphabet Blocks** - A two disk set for pre-readers. Touch, watch, listen, and explore letters and sounds, the basic building blocks of reading. Little or no adult assistance needed. Five mouse rating from MacUser. **$31.**



CompuCraft - **Mac Art Library** is a collection of over 1,000 critically acclaimed clip art images.

- "Excellent and affordable"- *Online Today*
- "Exceptional"- *Colorado Computing*
- "5 Apples" - *MacTimes* **$140.**



Mainstay - **Think'nTime** will visually help you organize your work! **$59.** **MacFlow** is great for designing and documenting flow relationships of any type. **$110.** **MacSchedule** helps you create clear, graphic schedules fast! **$146.**

Truth in Labeling

Sheets of labels that automatically feed through a desktop laser printer make for easy printing of shipping, mailing, and other labels. A new line of auto-feed Avery labels withstand the heat produced by laser printers and come on sheets designed with top and bottom margins to accommodate the laser printer's page print specifications.

Avery's laser printer labels come in various sizes for mailing labels, shipping and inventory labels, round labels, color-coded file folder labels, and even an 8-x-11-inch label for mini-posters and notebook covers. Avery's Consumer Products Division is located at 818 Oak Park Road, Covina, CA 91724; (818) 915-3851. Call Avery at (800) 535-3232, for the name of a dealer in your area.

— Laura Johnson



UPDATES

Programs, like wine, often improve with age. To get the most out of your programs, you should be using the most recent versions. Here's a list of the current version numbers (as of press time) of many popular programs. The version number of a program can usually be found by running the program and checking the ABOUT... item at the top of the Apple menu.

Apple *System* software is special. Generally, and unless you have a 128K Mac, you should be running the latest System software. (128K owners should continue to use *System* 2.0 and *Finder* 4.1 and 512K, 512KE, and XL owners should stick with *System* 3.2 and *Finder* 5.3.) The latest Apple *System* software is available free from most user groups, national on-line services and local BBSs. The deluxe version (four disks, boxed and well-documented) can be purchased through Apple dealers for $49.95, not a bad deal considering what's included: *Finder* 6.0, *System* 4.2 or 4.3, and the long-awaited *MultiFinder* 1.0. As information on *MultiFinder* compatibility becomes available, we'll keep you informed.

All programs listed here are HFS compatible. The meanings of the codes in the right column are as follows: CP or NCP, copy protected or not; //, programs we have found to be Mac II compatible (not yet a comprehensive list); and S, shareware (try before you buy software). Changes and new listings are shown in **bold.** Compatibility is sometimes in the mind of the beholder. Programs that are listed as Mac II compatible may not perform 100 percent of the functions they offer on other Macs, nor do they necessarily take full advantage of the Mac II.

A.A.I.S. Prolog	M1.15	NCP
Acta	2.0	NCP,//
AMS General Ledger	2.08	NCP
AppleShare	1.1	NCP
Accountant, Inc.	2.1	NCP,//
Aztec C	3.4b	NCP,//
Back to Basics	1.03	NCP
Balance of Power	1.03	CP
Bulk Mailer	3.0	NCP,//
Business Filevision	1.1	NCP
CalendarMaker	3.0	NCP,//
Chart	1.02	NCP
Chooser	3.2	NCP
ClickArt Effects	1.01	NCP,//
Clipper	1.01	NCP
Cognate	1.5	NCP,//
ColorChart	1.3	NCP
Colorizer	1.1	NCP,//
ColorMate	2.1	NCP
ColorPrint	2.03	NCP
Comic Strip Factory	1.6	NCP,//
Comic Works	1.0	NCP,//
ConcertWare+	4.0	NCP,//
ConcertWare+MIDI	4.0	NCP,//
Copy II Mac	7.1	NCP
Copy II HD	7.1	NCP
Cricket Draw	1.1	NCP,//
Cricket Graph	1.2	NCP
Curator	1.04	NCP,//
Deluxe Music Construction Set	2.0	CP
DesignScope	1.14	NCP,//
Disk Express	1.10	NCP
Disk First Aid	1.0.1	NCP
DiskFit	1.4	NCP,//
DiskInfo	1.45	NCP,S
Disk Ranger	3.1	NCP
DiskTop	3.0.2	NCP,//
Dollars & $ense	4.0	NCP,//
Double Helix II	r40	NCP,//
Draw it again, Sam...	2.0	NCP,//
Easy3D	1.01	NCP
Edit	2.1	NCP
Excel	1.06	NCP,//
ExperCommon Lisp	2.2	NCP
ExperLisp	1.5	NCP,//
ExperLogo	1.1	NCP
EZ Draft	2.0	NCP,//
FastBack	1.02	NCP,//
File	1.05	NCP
Filemaker Plus	2.1	NCP,//
Finder (MFS-128K)	4.1	NCP
Finder (HFS)	6.0	NCP
Findswell	1.0b	NCP,//
FlashBack	1.6	NCP
Flight Simulator	1.0	CP
Fokker Triplane	1.0	CP
FONTastic Plus	1.4	NCP,//
Font/DA Mover	3.6	NCP
Fontographer	2.3	CP
Forecast	2.0	NCP,//
Frame Mac	1.1	NCP,//
FreeTerm	2.0	NCP,//
FullPaint	1.0	NCP
Gato	1.42	CP
GeoQuery	1.01	NCP,//
Glue	1.04	NCP
GraphicWorks	1.13	NCP
Hard Disk 20	1.1	NCP
Hard Disk Utility	2.0	NCP
HD Backup	1.0	NCP,//
HD SC Setup	1.5	NCP,//
HFS Backup	2.01	NCP
HFS Locator Plus	2.0	NCP
HyperCard	1.1	NCP,//
Illustrator	1.0	CP/NCP,//
ImageWriter	2.6	NCP
ImageWriter, AppleTalk	2.6	NCP
InBox	2.0	NCP
Insight Expert Accounting	2.01	NCP,//
inTalk	3.0	NCP,//
Jam Session	1.1	CP,//
Jazz	1A	CP
JustText	1.1	NCP
Laser Author	1.3	NCP,//
Laser Prep	5.1	NCP
LaserShare	1.0	NCP
LaserSpeed	1.5	NCP,//
LaserStatus	2.0	NCP
LaserWriter	5.1	NCP
Layout	1.3	NCP,S
Legal Billing	1.72	NCP,//
Legal Billing II	2.39	NCP,//
Lightspeed C	2.01	NCP
Lightspeed Pascal	1.0	NCP
Listen 2.0	2.1	CP,//
Lode Runner	1.0	CP
Lookup	1.0c	NCP,//
Mac3D	2.1	NCP,//
MacASM	1.2	NCP
MacBillboard	4.01	NCP,S
Mac C	5.0	NCP,//
MacCalc	1.2	NCP
Mac Daisy Link	1.04	NCP,//
Mac Disk Catalog II	2.1C	NCP
MacDraw II	1.0	NCP,//
MacDraft	1.2b	NCP,//
MacFlow	1.02	NCP
MacFortran (all)	2.3	NCP,//
MacGolf	3.0	CP,//
MacInTalk	1.1	NCP
MacLabeler	2.2	CP
MacMoney	3.01	NCP,//
MacMovies	1.02	NCP
MacNosy V2	2.8	NCP
MacPaint	2.0	NCP,//
MacPalette	1.0	CP
MacPascal	2.1	CP
MacProject II	1.0	NCP,//
MacProof	3.0	NCP
MacSafe	1.08	NCP,//
MacScheme+ Toolsmith	1.51	NCP,//
MacServe	2.3	CP,//
MacSpec	1.3	CP
MacSpin	1.1	CP
MacSpool	2.1	NCP
MacTerminal	2.2	NCP
MacTools (MFS/HFS)	7.1	NCP
MacWrite	5.0	NCP,//
Mac Zap	5.0	NCP,//
MailManager	1.0	CP
MapMaker	2.0	NCP
MDA	2.0	NCP,//
MDS	2.0	NCP
Measure Test	12.7	CP,S,//
MenuFonts 2	2.0	NCP,//
Megamax C	3.0	NCP
MicroPhone	1.1	NCP,//
Micro Planner Plus	5.8b	NCP
MindWrite	1.1	NCP,//
miniWriter	1.4	NCP,S
MockPackage+	4.3.4	NCP,S
MORE	1.1C	NCP,//
MPW	2.0b	NCP
MS BASIC	3.0	NCP
MS BASIC Compiler	1.0	NCP
MS Fortran	2.2	NCP
MS Works	1.1	NCP,//
Multiplan	1.11	NCP,//
MusicWorks	1.1	CP
myDiskLabeler	2.11	NCP,//
Neon	2.0	NCP
Omnis III Plus	3.25	NCP,//
OverVUE	2.1e	NCP,//
PackIt III	1.3	NCP,S
PageMaker	3.0	NCP,//
Parameter Manager	1.092	NCP
Performer	2.31	CP
PictureBase	1.2	NCP
Plains and Simple	4.1	NCP,//
PLP	2.0	NCP,//
PowerStation	2.3	NCP,//
Professional Composer	2.1	CP
Profit Stalker II	1.3	NCP
Programmer's Online Companion	2.0	NCP,//
Project Billing	3.0	NCP,//
QUED/M	2.04	NCP
QuicKeys	1.1	NCP,//
QuickWord	2.0	NCP,//
Rags to Riches	3.0	CP,//
Ragtime	2.01	NCP,//
Read-It!	1.1	NCP,//
Ready, Set, Go!	4.0	NCP,//
Record Holder	2.1	NCP
REdit	1.2	NCP
Red Ryder	10.3	NCP
Reflex Plus	1.01	NCP,//
ResEdit	1.1b7	NCP,//
Sargon III	1.0	CP
Scoop	1.01	NCP,//
SideKick	2.0	NCP
Silicon Press	1.1	NCP
Slide Show Magician	1.3	CP
Smartcom II	3.0A	NCP,//
SmartScrap & The Clipper	1.03	NCP,//
SoundCap	4.4	CP
Space Edit	2.0	CP,//
SpellNow	1.0	NCP
Spellswell	2.0f	NCP,//
StatView 512+	1.1	NCP
StatWorks	1.2	NCP,//
Stella	1.3	CP,//
Stepping Out	2.0	NCP,//
Straight Talk	2.08	NCP,//
Studio Session	1.4	CP
Suitcase	1.2.1	NCP,//
SuperGlue	1.03	NCP,//
SuperPaint	1.00	NCP,//
Switcher	5.1	NCP
System (MFS-128K)	2.0	NCP
System (HFS)	4.3	NCP
Telescape Pro VT 100	1.3	NCP
Tempo	1.2	NCP
Textures	1/01	NCP,//
ThinkTank	2.0	NCP,//
Thunder!	1.0.1	NCP
Thunderscan	4.0	NCP
TML Pascal	2.01	NCP
TMON	2.8	NCP
Top Desk	3.0	CP
TOPS	2.0	NCP,//
Trapeze	2.0a	NCP,//
Turbo Maccountant	2.0	NCP,//
Turbo Pascal	1.1	NCP,//
VersaTerm	3.0	NCP
VersaTerm Pro	2.0	NCP
VideoWorks II	2.0	NCP,//
VIP	2.5	NCP,//
Widgets	3.0	NCP
Word	3.02	NCP,//
Write	1.0	NCP,//
WriteNow	1.0	NCP,//
XPress	1.1	CP/NCP,//
ZBasic	4.0	NCP

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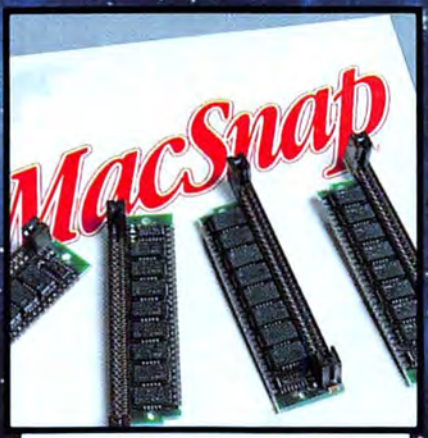
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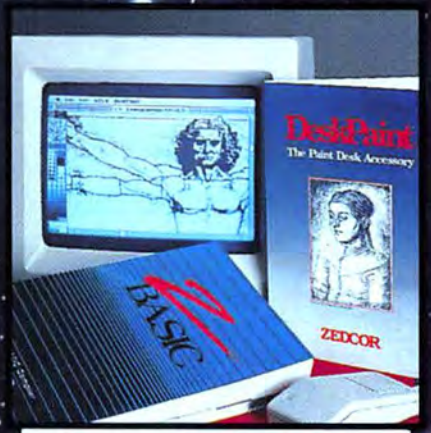
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TECH TIPS From Uncle Dennis

Dennis Wilkins,
MacZone Technical Advisor

Speed up your file search

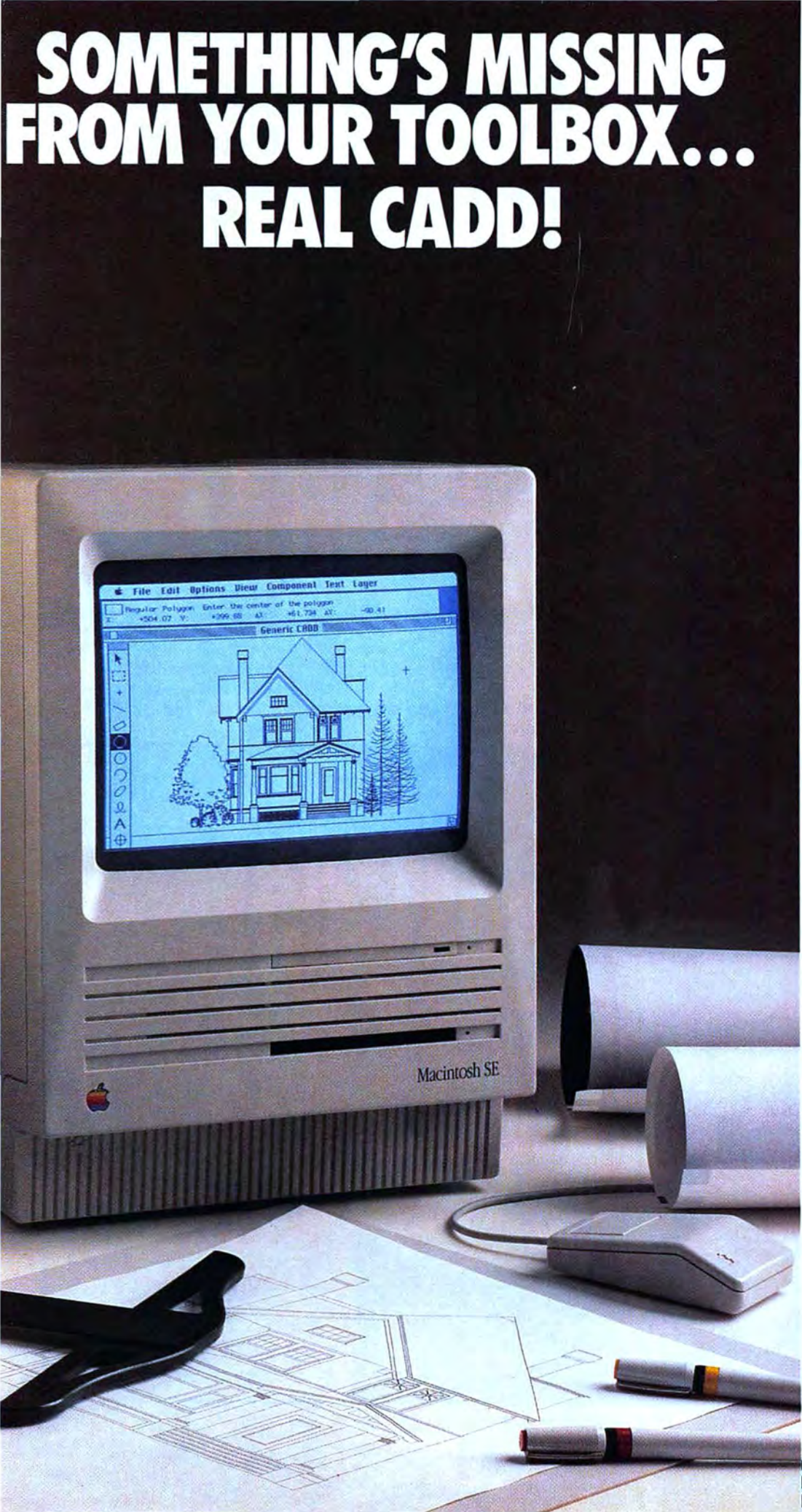
The File Menu: Have you scrolled a long list looking for a file to open? It is not necessary to scroll because the Mac will scroll it for you. Here's how to speed up the search for a specific file among a large number of files in a folder. After choosing OPEN from the file menu, type the first letter or two of the file you wish to open. The program's finder will take you directly to the first file with that combination of letters. If your Mac starts the search before you have typed all the letters, you can change the insertion rate of the letters in the control panel. Open the Keyboard Icon and select *slow repeat rate*. At a slower speed more letters can be entered before the search sequence is initiated.
(For more Tech Tips from Uncle Dennis ask for The MacZone Magazine with your next purchase)



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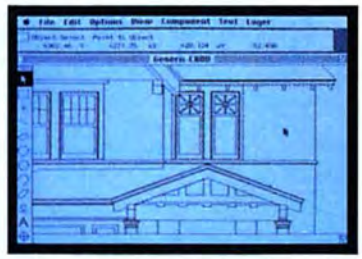
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Take one canned script, toss in an icon or two, and sprinkle in a soupçon of sound and visual effects. It's an easy recipe for an instant *HyperCard* stack, courtesy of *The HyperCard Construction Kit*.

The HCK makes it easy to add many of the most frequently used functions and cosmetic embellishments — like fades, wipes, dissolves, and digitized sound — to your stacks. The four-disk kit also includes a collection of clip art and a utility for organizing your art files. *The HCK* also includes an animation tool, over 30 external commands and functions, and a library of *HyperCard* learning tools and reference materials.

The HCK comes from Telesis Software Systems, 4525 Northpark Drive, Suite 101, Colorado Springs, CO 80918; (800) 525-2226 or (719) 593-7377. The price for all this convenience is $199.95.

— *Jon Zilber*

DIALOG BOX OF THE MONTH

Okay, so this isn't really a dialog box. Who cares? It still gave us the biggest laugh we've had all month.

Chris Habig, a PSC in the AF, down in TX, took one look at this ad in his Sunday San Antonio paper and knew it was BS. After all, the MAC doesn't come with IBM RAM, it comes with 1MB RAM.

We salute Chris for his powers of observation, and we've sent him a check for $25 with the certain knowledge that he's too smart to become an officer. If you'd like to join the honor roll, save a copy of your screen in *MacPaint* format (that's Command-Shift-3) on disk, so we can reproduce your masterpiece here at the office. Send your submissions to Dialog Herb c/o *MacUser*, 950 Tower Lane, 18th floor, Foster City, CA 94404. No calls, please.

— *H.D. Plant*

test drive.
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The Apple Macintosh II comes complete with IBM RAM expandable to 8MB. An 800K floppy disk drive. A hard disk with up to 80MB of storage. A 12" high resolution color monitor. The ability to support Unix and MS-DOS® so you can run a host of IBM PC® software. And of cou[illegible]
extended keyboard.

Cash, Check, or Mac

Computers started appearing at check-out stands several years ago, but the Mac has only now made its debut. APG has just introduced a pair of cash drawers that connect to the Mac via either of the serial ports. When used as part of a system with programs like Great Plains Software's *Plains and Simple* or ShopKeeper Software's *ShopKeeper* or *BillIT*, they can turn your Mac into a combination cash register, customer data manager, inventory checker, and accountant.

APG's cash drawers are available as either dedicated or intelligent units. The dedicated model opens its drawer on any ASCII character, at any baud rate, and is usually employed as a standalone unit. Its list price is $295. The intelligent model opens on the ASCII null character and, by using a Y connector, it can share the serial port with a printer, bar code read-

We tear up the competition on both price and quality



Hardware House, Inc., introduces **MAX**, a new series of 40 and 80mb hard drives for the MAC SE and MAC II, utilizing state-of-the-art 3½" mechanisms from QUANTUM.

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Put your money where you Mac is. An APG cash drawer can speed up your transactions. Sorry, buddy, this is the express lane — 1200 baud or less. (For those who store their money the old-fashioned way, we understand APG is coming out with a Mac-ennhanced mattress.)

er, or modem. It lists for $395. Both drawers are available with either 8-pin DIN or 9-pin D-shell connectors and are compatible with everything from a Plus to a Mac II. To find out more, contact APG at 1601 67th Avenue North, Brooklyn Center, MN 55430-1789; (612) 560-1440.

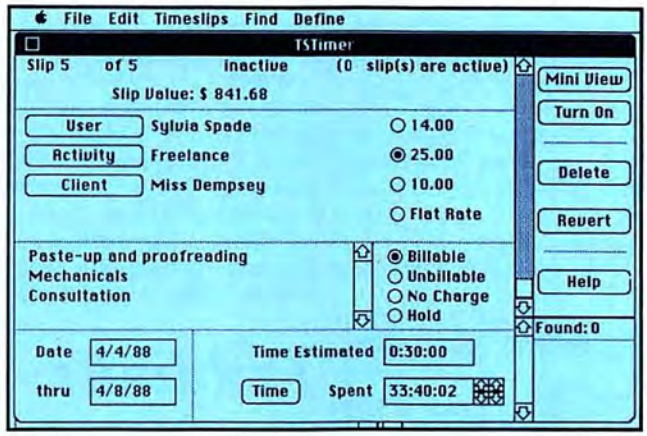
—Russell Ito

Time Keeps On Slipping, Slipping

When time is money, an ever-present tool for keeping track of your billable hours can be invaluable. *Timeslips III* is a time and expense tracking application that stores information for as many as 250 billers with 2000 billees (with up to 250 different activities and 128 projects per client).

Timeslips generates a variety of reports for billing, bookkeeping, and analyzing your productivity, and can separate taxable and non-taxable items. A desk accessory lets you call up a project timeslip at any time, with a running tally of seconds ticking away (the deadline approacheth) and dollars piling up (your quota's in sight). *Timeslips III* (list price: $199.95) comes from North Edge Software at 239 Western Avenue, Essex, MA 01929; (617) 768-6100.

— Jon Zilber



Fill In the Blanks

If April 15 is your favorite holiday and 1040 is your favorite number, you're probably already familiar with *MacInTax* from SoftView. Now you can enumerate and itemize to your heart's content long after tax season has come and gone, with SoftView's *FormSet*, a collection of general business forms due out by the time you read this. The $95 library includes a standard contractor agreement, request for quotation, certificate of resale, and other mercantile and legal staples.

Like *MacInTax*, *FormSet* lets you rearrange the on-screen appearance of the forms for easier input, automatically retaining all the relationships among the various elements in the form. SoftView also plans to release a library of personal finance forms and a forms-generating system later this year. For more information, contact SoftView at 4820 Adohr Lane, Suite F, Camarillo, CA 93010; (805) 388-2626.

— Jon Zilber

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Q: What Did She Say in Her Acceptance Speech? A: I Don't Know — I'll Oscar

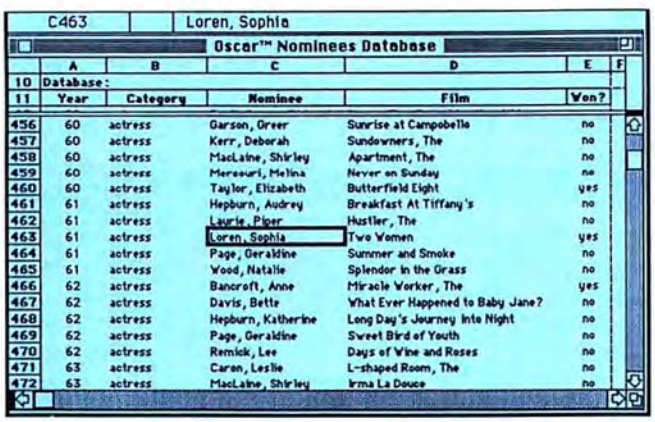
Have you ever wondered (and who hasn't?) if Will Rogers ever said anything clever about the movies? Or who won the Academy Award for Best Actress in 1961? And just what other important events happened in 1961? Perhaps you suspect that this kind of information resides in a stack somewhere, but then the question is: where can you find this stack?

Boy, you ask a lot of questions. The Heizer Software catalogue, home of the Excellent Exchange for *Microsoft Excel* and Works-Xchange for *Works*, may have some answers. Heizer's Stack Exchange is a listing of stackware from various authors. In this exchange you can find stacks on anything from the Academy Awards (located on the *Oscar Nominees Database;* list price: $15) to famous quotes (*2001 Quotes;* $25) to what happened when (*Events Day-by-Day;* $35). These databases (and many others) are available in both *HyperCard* and *Excel* formats.

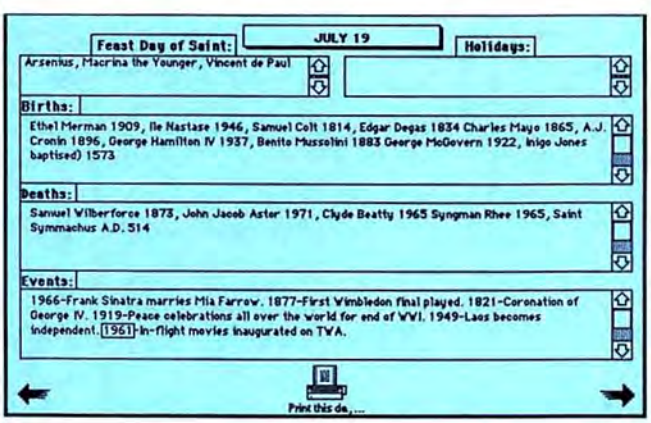
For more information, contact Heizer Software at 1941 Oak Park Blvd., Suite 30, Pleasant Hill, CA 94523; (415) 943-7667.

Oh, and since you asked, "There is only one thing that can kill the movies, and that is education"; Sophia Loren, in *Two Women;* and the introduction of in-flight movies on TWA.

— Dori Harshman



We're still waiting for a database of Oscar acceptance speeches — yes, Sally, we still like you (despite *Murphy's Romance*) and, no, Bernardo, *Cupertino* is The Big Apple. For now, we'll settle for the *Oscar Nominees Database* from Heizer Software.



Where were you when the lights went out? And what did you miss? Find out with Heizer Software's *Events Day-by-Day* database.

Finding a Jewish Date

We all know how hard it is to keep track of appointments when you have more than one calendar. And when one of those calendars doesn't even have the same dates, the task becomes doubly frustrating. For those who need to keep track of Jewish holidays, festivals, and Torah portions, as well as regular appointments, Davka has come to the rescue with *Hebrew CalendarMaker.*

Hebrew CalendarMaker generates a date file that is compatible with CE Software's *CalendarMaker.* This very simple program prompts the user for the current Gregorian year and generates a list of Hebrew date equivalents that can be imported into *CalendarMaker.* Many of the Macintosh conventions are ignored and screen refreshing is poor, but these are annoyances that you'll encounter only once a year.

The disk includes versions for use with *CalendarMaker* 2.0 and 3.0 and fifteen *MacPaint* files that illustrate the Jewish holidays. A replacement file for *CalendarMaker*'s date icons also accompanies the program.

This $29.95 program also goes beyond key disks or simple statutory copy protection; it uses a far more sophisticated and time-honored technique: guilt! The label warns that copying the disk is in violation of Biblical Commandments and may be against federal and state laws.

If you need a Jewish date, *Hebrew CalendarMaker* may be just your matchmaker. Contact Davka at 845 N. Michigan Avenue, Suite 843, Chicago, IL 60611; (312) 944-4070.

— Daniel Rasmus

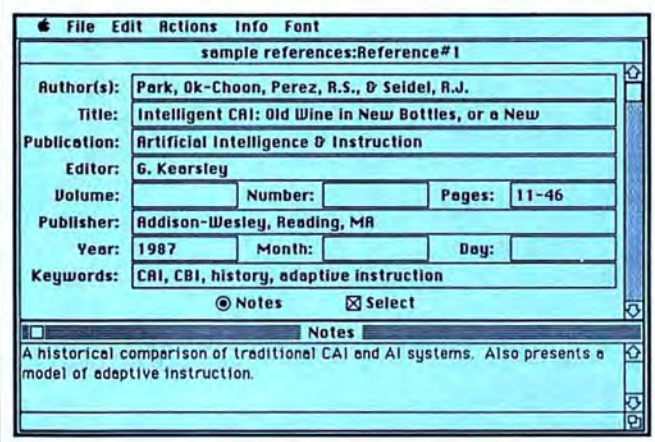
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— Victoria Juarez



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CLARIFICATIONS

Obfuscations obviated, ambiguities arbitrated, and errors eradicated.

AFTER DINNER ADJUST-MINT

Jim Gable, a spokesman for Apple Computer Inc., spotted some errors in "Laser Fare," our May '88 review of the LaserWriter II family of printers. The NTX does not contain a 68881 coprocessor (which prompts the question, "Why not?"). Also, screen font character widths for the SC *do* match those for PostScript printers, at least for roman fonts. Thus, this is not the reason why some documents require reformatting after an SC-to-NT upgrade. Gable assured us that this is a rare phenomenon, which crops up chiefly when narrow page margins are used. Guess we just lucked out.

JUST THE FAX, MA'AM

An incorrect phone number was given for Mirus in "It's a Mac, Mac, Mac, Mac World" in our April '88 issue. (That squawk you heard at the other end was Mirus' facsimile machine.) The correct number is (415) 949-5544.

THE PRICE REMAINS THE SAME

Some of you may already have discovered an apparent discrepancy in recent ads for Bering Industries' Totem drives. The ads say that a free 20-megabyte cartridge is included with their Totem 80MB, 20MB, the Totem II, and Totem Dual 2020. Don't count on it, however.

By the time the ad copy was placed with various magazines, including *MacUser*, reality intruded, as it has a habit of doing. Due to cost increases in the drives' manufacture, Bering was faced with either "reneging" on the cartridge offer or raising the price of the drives. They decided the free cartridge had to go. Unfortunately, the realities of publishing lead times mean that the original ads will appear for a while. The 20-megabyte cartridges are $85 each; $75 each if you buy three or more. You can get in touch with the company by calling (800) 237-4641. And look at it this way: when's the last time *any* company opted for keeping prices stable?

THE BIG FIX

This is a sad story, so get a kleenex ready. Seems a headline in the May '88 "New On the Menu" section inadvertently used the phrase *The Big Picture* to refer to a Mac display product. That phrase is an E-Machines registered trademark for its Mac monitor products.

We recommend you take an x-acto knife, remove the offending page from the magazine, shred it, and hoover up the pieces. Then reward yourself with a coke and a twinkie from the fridgidaire. (You might want to xerox this page for future reference.)

RESOLVED: HIGHER RESOLUTION

The name and resolution of ASK LCD's liquid-crystal projector given in "And Now Presenting . . . " in our May '88 issue were incorrect. The product is called the Mac-Screen Overhead and it has a resolution of 512 x 342 pixels, matching the Mac's screen resolution.

BETTER CLIP ART.



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Does the thought of losing all the data on your hard disk make you nervous? What would happen if you just lost a single file, say the final draft of your 66-page yearly report? Does your hard disk seem a little slower than usual? Tough questions. With one easy answer. Symantec Utilities. Symantec Utilities can waltz right in and recover, save, or speed disks up. Without dancing you around.

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by Robert R. Wiggins

Process of Elimination

Two issues ago I waxed eloquent on the veritable cornucopia of Macintosh applications that are flowing into software distribution channels from the fertile minds of the development community. Business users are awash with myriad choices. But every silver lining has a cloud.

This particular cloud is not new, except to Macintosh users. It's called software selection. Business users of the IBM PC have faced this particular problem for some time, and now Macintosh users can join the crowd.

In olden times before microcomputers the problem of software selection did not exist, at least not for the user. Applications were written for mainframes by the data processing department, and "selecting" software meant begging DP for a custom application and then waiting (sometimes for years) until DP got it up and running.

As computer hardware got smaller and more widespread, software was going through similar changes. Instead of custom software, the trend was toward software "packages," prewritten generic software for specific applications. The task of the user switched from assisting in custom software design to selecting the appropriate software package.

Many large companies, accustomed to central support, formed microcomputer support groups. These groups regularly evaluated software packages and helped user departments in the selection process. They also provided support when problems arose, often acting as intermediaries between the software developers and publishers. Some companies went a step further and developed "approved" software lists, allowing only software on the lists to be purchased by user departments.

When the Macintosh came along, it was typically not on the approved hardware list, so these central support



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groups generally ignored it. Many users were forced to overcome obstacles to acquisition of Macintoshes and, once they had purchased them, were on their own as far as software selection went.

Whether you use your Mac in a large company or a small one, and whether you have a central support group or not, you still have to select the software you use. If you have a central support group who prepare an approved software list, some of the process of elimination will be done for you. If you're on your own, the whole process will be your problem. Here are some things to consider during your own process of elimination.

Features: This may seem trivial, but people have been known to overlook a feature or two. The important thing is to match your needs against the feature sets, and don't just select the product with the most features. Break your requirements into required features and desired features. Eliminate products lacking your required features.

Reviews: While no reviewer will have approached any product with your unique requirements in mind, you can get a basic idea of the software from its reviews. Eliminate any products that got universally unfavorable reviews.

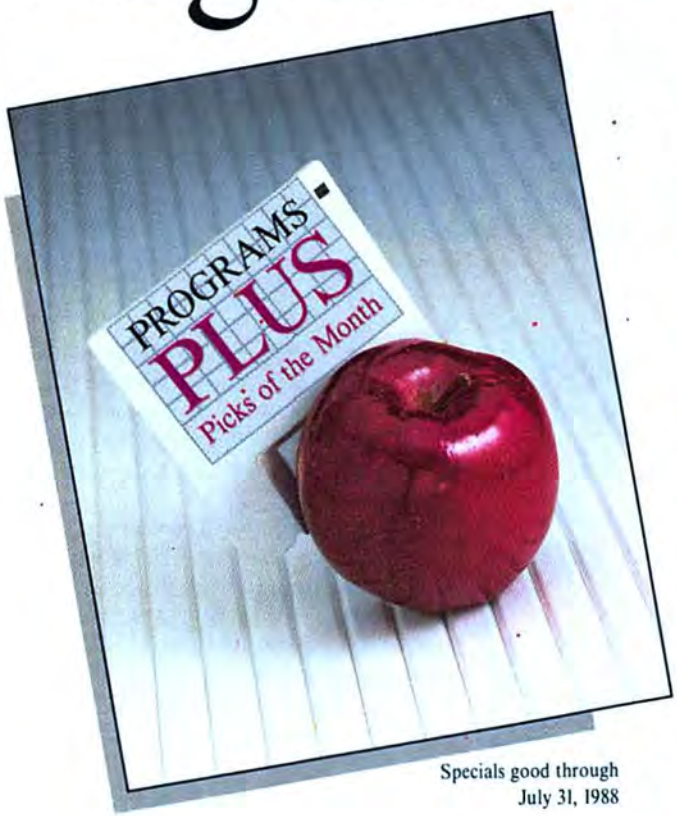
Opinions: Seek out the opinions of people you trust. Others who have trod the path before you can offer insights. Beware, though, of people with religious fervor for a particular product. Desktop publishing is an area where this is often encountered, with "camps" representing each of the major products.

Support: Find out what kind of support is available for each product considered. Support varies greatly, from unlimited free phone support to limited support with additional fees.

Company Reputation: Some companies attract great loyalty from their users. There's usually a reason, so check out the company. Eliminate products from companies with bad reputations. Also look at the company's health and stability. The best product in the world becomes worthless when the company behind it disappears and all support vanishes.

Compatibility: Most Macintosh applications are by default compatible with other Mac applications, at least at the Clipboard (cut and paste) level. Eliminate any products that lack this simple compatibility, unless they offer file-level compatibility. Some file formats have become relatively standard, among them *MacPaint* and PICT. There are also newcomers to the "standard" file formats such as TIFF (for scanned graphics) and EPSF (encapsulated PostScript). In the word processor arena, *MacWrite* is a fairly standard file format, also. Some applications also feature file-level compatibility with IBM PC programs. For example, *Excel* can read and write *Lotus 1-2-3* WKS files, *4th Dimension* can

Programs & Peripherals



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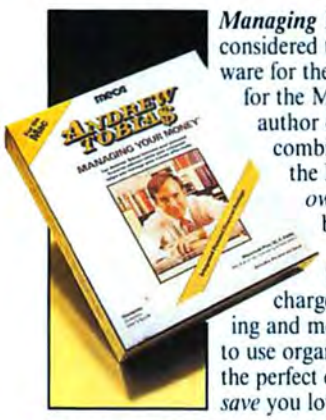
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Managing Your Money **129.**

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Greene, Inc. QuickDex 1.4	32.	**Symmetry** HyperDA *(Req. 512K)*	38.

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Cognition Technology		Microsoft Basic Compiler 1.0	125.
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Berkeley System Design Stepping Out II	54.	Icon-It! *(Assign Icons to Menu Items)*	39.
Beyond Inc. Menu Fonts 2 or Fore Runner	32.	Read-It! TS *(For Thunderscan)*	79.
CE Software QuicKeys *(Macro Program)*	57.	Read-It! O.C.R. *(For Image Scanners)*	199.
DiskTop 3.0 or CalendarMaker 3.0	29.	**Software Power** Power-op Disk Optimizer	33.
Central Point Software		**Software Supply** Suitcase or Power Station	37.
Copy II Mac *(Includes MacTools)*	20.	**SRT** MacTree	38.
Design Software/Electronic Arts		**SuperMac Software** SuperSpool	42.
DS Backup *Special*	49.	SuperLaserSpool	82.
Dove RamSnap	21.	Multi-User SuperLaserSpool	199.
Electronic Arts Disk Tools Plus	31.	Diskfit 1.41	54.
Emerald City Software LaserTalk	187.	Network Diskfit 1.3	203.
Fifth Generation Systems		Sentinel	155.
FastBack For The Macintosh	59.	**Synex** Mac Envelope	19.
Ideaform Disk Quick V2.10	25.	Mac Invoice	32.
Hyper Book Maker	39.	**TOPS** Tops For The Macintosh 2.0 or Net Print	119.
Infosphere Liaison	129.	**Williams & Macias** Disk Finder	29.
MacServe *(Network Software)*	158.	myDiskLabeler w/Color	31.
LaserServe *(LaserWriter Print Spooler)*	62.	myDiskLabeler w/LaserWriter Option	34.
Microlytics, Inc. GOfer	49.	**Working Software, Inc.** Findswell 2.0	36.
Olduvai Software ADBridge	89.		

Communications Software

Apple Computer MacTerminal	99.	**Software Ventures**	
Compuserve Compuserve Starter Kit	24.	Microphone II *(Includes Glue)*	229.
DataViz MacLink Plus with Cable	145.	**Think Technologies, Inc.**	
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Micro Systems Software Analyze! 99.
North Edge Software
Timeslips III 119.
Satori Software Bulk Mailer 3.0 79.
Bulk Mailer Plus 195.
Shana Enterprises Fast Forms 79.
Turner Hall Publishing MacSQZ! 49.

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Claris MacWrite 5.0 119.
Living Videotext
More 1.1C *(Color Version)* 175.
Microsoft Microsoft Word 3.01 249.
Microsoft Write 113.
Symmetry Acta V2.0 36.
T/Maker Company
WriteNow V2.0 98.

Spelling & Grammar Checkers

Aegis Development
Doug Clapp's Word Tools 42.
A.L.P. Systems MacProof 3.0 *(Requires MacPlus)* 115.
Batteries Included Thunder! 1.23 30.
Deneba Software Spelling Coach 3.0 *(Webster's/Medical/Legal/Hyphenation)* 54.
Spelling Coach 3.0 Professional *(Adds Definitions & Thesaurus)* 109.
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WorksPlus Spell 1.1 46.
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Sensible Speller 48.
Working Software, Inc. Spellswell 2.0 42.
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Lookup *(Makes Spelling Suggestions)* 29.

Desktop Publishing

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Aldus Corporation PageMaker 3.0 475.
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Postcraft International, Inc.
Laser FX 115.
Laser FX Font Packs #1-8 *(each)* 30.
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Business Sense 279.
Dollars & Sense 4.0 81.
Peachtree
Back To Basics 3-Pak *(GL/AR/AP)* 139.
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MacMoney 3.0 *(Enhanced Version)* 62.

Statistics & Math Packages

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Math View Professional 145.
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Systat Systat 3.1 *(Specify Mac 512K, MacPlus, or Mac II)* *Special* 459.

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A+ ADB Mouse *(Mac SE/Mac II)* 87.
Moustrak MousePad 7"x9" Size 8.
MousePad 9"x11" Size 9.
Nuvotech
EasyNet *(Specify Din 8 or DB-9)* 27.
TurboNet 128/512k or TurboNet Plus 27.
Orange Micro Grappler C/Mac/GS *(Parallel Interface for the Mac)* 84.
Grappler L/Q *(Parallel Interface for 24 Pin & Laser Printers)* 98.
Ribbons
Available in Black, Blue, Brown, Green, Orange, Purple, Red, Yellow, Silver & Gold
ImageWriter Ribbon 4.
ImageWriter Black 6-pack 20.
ImageWriter Rainbow Pack *(6 Colors)* 20.
ImageWriter II-Four Color Ribbon 9.
Silicon Comforts MacChimney *(Very Effective Cardboard Laminate Convection Cooling Device)* 16.
SoftStyle MacEnhancer 159.
Sopris Softworks
High Trek Carry Cases - Platinum Gray, Navy
Imagewriter II Case 49.
Macintosh Plus, SE w/Standard Kybd 59.
Macintosh SE & Extended Kybd Case 69.

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Bulk *(Sony)* 3½" SS/DD Disks *(10)* 12.
Sony 3½" SS/DD Disks *(box of 10)* 13.
Centech 3½" SS/DD Color Disks *(10)* 16.
Fuji 3½" SS/DD Disks *(box of 10)* 13.
Maxell 3½" SS/DD Disks *(box of 10)* 13.
Verbatim 3½" SS/DD Disks *(box of 10)* 13.
3M 3½" SS/DD Disks *(box of 10)* 14.

Double Sided 3½" Diskettes
BASF 3½" DS/DD Disks *(box of 5)* 9.
Bulk *(Sony)* 3½" DS/DD *(10)* 17.
Centech 3½" DS/DD Color Disks *(10)* 19.
Sony 3½" DS/DD Disks *(box of 10)* 18.
Fuji 3½" DS/DD Disks *(box of 10)* 19.
Maxell 3½" DS/DD Disks *(box of 10)* 20.
Verbatim 3½" DS/DD Disks *(box of 10)* 19.
3M 3½" DS/DD Disks *(box of 10)* 20.

Modems

Epic
Epic 2400 Int. SE 249.
Epic 2400 Int. Mac II 249.
Epic 2400 Plus Ext *(Hayes Compatible)* 155.
Everex Emac 2400 Baud 225.
Hayes Microcomputing
Smartmodem 1200 299.
Smartmodem 1200 Mac w/Smartcom II & Cable *(MacPlus)* 359.
Smartmodem 2400 449.
Migent Migent Pocket Modem *(ext. 300/1200 Baud)* ***Special*** 115.
Novation Novation Parrot 1200 93.
Practical Peripherals
Practical Modem 1200SA 109.
Practical Modem 2400SA 189.
MacCommpack *(2400SA w/Microphone & Cable)* 249.
Prometheus
Promodem 1200 *(Hayes Compatible)* 239.
Promodem 2400 *(Hayes Compatible)* 309.
Mac Pack w/Procom M and Cable 49.
Shiva Net Modem V1200 369.
Net Modem V2400 489.
Net Modem X232 309.
Net Bridge 309.
Supra Corporation Supra Modem 2400 154.
U.S. Robotics
Courier 1200 *(Hayes Compatible)* 199.
Courier 2400 *(Hayes Compatible)* 349.
Courier 2400E *(Hayes Compatible)* 379.
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The ***Migent Pocket Modem*** is a fully Hayes compatible 300/1200 Baud modem ideal for those who need real telecommunicating power while on the road or at home. Although small in size (only 5 inches by 1¼ inches), it's packed with features and accessories which allow you to get right to work. It comes packaged with Borland's Mac Term 2.0, a desk accessory terminal program allowing you to transmit and receive while running other applications. You can transmit files as both text and MacBinary XMODEM, operate in both half and full duplex, and even store up to 7 frequently used phone numbers. Although a 110 volt power adaptor is included, while on the road you can operate up to 10 hours on one standard 9 volt battery. Also included with the *Migent Pocket Modem* are all cables necessary to begin transmitting today!

Migent Pocket Modem **115.**

DS Backup by Design Software/Electronic Arts



DS Backup is a hard disk utility designed to make the task of backing up your data simple and fast. Through the use of Macintosh pull down menus you can select folders and files quickly by point and click mouse commands. *DS Backup* automatically estimates the number of floppies (either 400 or 800K), and formats and checks the disk before copying. You can backup to any Macintosh compatible drive using the MFS of HFS file system. *DS Backup* also allows for archival backup of data (backing up only files changed since the last backup), and offers a reporting feature to ensure that everything you need is backed up. These features, as well as the ability to back up files larger than one floppy, sector squeezing, and operations 3 times faster than the Finder makes *DS Backup* the new industry standard for backing up the Mac.

DS Backup **49.**

SYSTAT 3.1 by SYSTAT, Inc.



SYSTAT 3.1 is the most comprehensive statistics package ever written for the Macintosh. Most Mac statistical packages call themselves "professional" or "comprehensive". But, feed them some *real* problems, and you'll discover how toothless they really are. They can't do multivariate procedures, analyze financial time series, fit nonlinear models or compute large, multi-way cross tabs. That's why, if you're serious about statistics, sooner or later you'll end up with *SYSTAT 3.1*.

SYSTAT 3.1 **459.**

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It's a safe bet that no matter what Macintosh model you have, Dove Computer has a ***MacSnap*** memory expansion product that matches your needs. That's because Dove has an extensive line of high quality memory and productivity enhancement products available. All Dove products are easy to install and represent a superior value! We've selected some of the most popular models, and are offering them at special prices. All models listed include Dove's RamSnap software, their intelligent ram management software.

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MacSnap 524E **189.**
MacSnap 524S **250.**
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MacSnap Plus 2 **315.**

MacSMARTS by Cognition Technology



Since it's release ***MacSMARTS*** has become the best expert shell system available for the Macintosh. It's list of features include context sensitive on-line help windows, three levels of security for knowledge base access, inference engine with forward and backward chaining, and a complete report generating capability for advice and session logging. *MacSMARTS* version 3.0 can perform object oriented secondary links via hypertext through it's SMARTStack linking option. This feature allows *MacSMARTS* to utilize huge knowledge and graphic databases stored in hypercard formats and include them in your expert system. *MacSMARTS* and the Macintosh give you the tools and technology for propelling your mind and computer into the 21st century.

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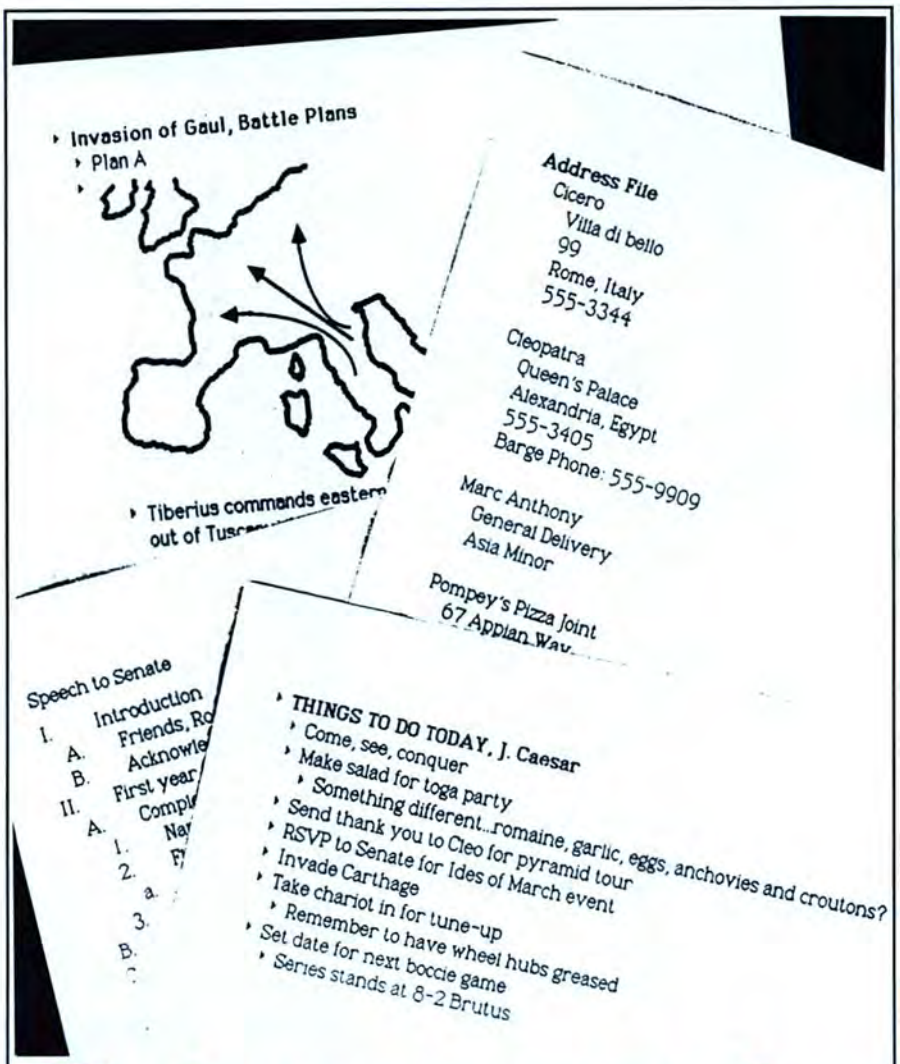
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PINSTRIPE MAC

read and write *dBASE III* files, and *PageMaker* can share files with its own PC version.

Test Drives: No matter how exhaustive your selection process is, there is no substitute for trying out the software. Some companies offer "trial" versions of their products, which usually lack a critical feature such as printing. If you're doing the selection for a large department or company, buy one copy of each product being evaluated. Otherwise, if trial versions are unavailable, you'll have to find a dealer who'll let you try out software.

Phased Implementation: Once you select a product, the process shouldn't necessarily end. If you're selecting for a group, buy just a few copies and put them to work. Then you can evaluate the product after using it for real work and uncovering any hidden bugs or problems. This will avoid getting stuck with dozens of copies if the product proves unsuitable.

To sum up the software selection process: use your head. Don't just charge out and buy the latest and greatest software because of the ads or the reviews. Take the time to evaluate. And look on the bright side: The process of elimination is only necessary because of the wealth of choices available.

PINSTRIPE PICKS

Here are some recently released or upgraded products worth looking into if you use your Macintosh in business:

PageMaker 3.0: (Aldus) Another major update to the popular desktop publishing product adds many features requested by users.

SmartCom II 3.0B: (Hayes) A new and improved version of the powerful telecommunications package with support for color and *MultiFinder*.

Redux: (Microseeds Publishing) A new full-featured back-up program that includes a scripting language for total control of back-ups.

MacWorkstation: (Apple) An expensive but powerful and flexible product for creating Macintosh-to-mainframe links.



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by Jim Seymour

Mac II Power Plays

Remember when the Mac II first appeared last year? Remember how incredibly *powerful* it seemed? Finally: a 68020 — they had the sense to put the math coprocessor in, too; eight megs of RAM on the motherboard, all those slots, even . . . COLOR! George Carlin on late-night UHF stations: "Just nineteen ninety-five for LPs, just twenty-four ninety-five for cassettes — Why, it's all the music you'll ever need!" Surely the Mac II was so powerful it was all the computer anyone would ever need. So powerful everyone would start writing for it right away. So powerful we wouldn't run out of horsepower for a loooong time with this baby.

Ahem. At least part of that equation worked out: a lot of programmers *did* start writing for the Mac II almost immediately. Sure, some programmer time was taken up dealing with the developers' problems with current products that didn't work properly on the Mac II; that code had to be tweaked first. Company cash flow and all that. And color QuickDraw took a little thinking about, but not much. Coders were pretty quickly off to the races with Mac II programs.

But we didn't *see* any of those programs for an awfully long time. If we needed a reminder of how long it takes to develop genuinely new programs for a new environment, the Mac II provided it. Macworld in Boston late last summer gave us a glimmer of what the Mac II would be all about (to say nothing of gathering most of the Mac IIs extant under one roof). Big programs, lots of memory, big color monitors — hey, this felt like an Apple event-marketing promotion all over again!

But those programs still didn't ship. Like George Raft leading fellow prisoners in banging metal plates on the tables in the prison cafeteria— or like a bunch of half-crazed adolescents screaming "We want our MTV!" — we in effect screamed "We want our Mac II programs! We're tired of running stuff written for old Macs on our Mac IIs! We want *our* MTV!" And now we've started to get it.



BOB SCOTT

One reason you won't find animation in *PowerPoint:* the Mac II can't move long-palette, high-res images around fast enough.

PixelPaint was the first real dazzler on the Mac II. It looked good in demos late last summer, was the belle of the ball for Mac fans at fall Comdex, became an overnight standard by January's Macworld show. Almost as hard to get into as *Adobe Illustrator* but ten times more fun, *PixelPaint* showed us brilliant ways of mixing colors, sold big color monitors like crazy (no wonder SuperMac sells it), and imprinted on the collective unconscious of the Mac community the image of a frog now more famous than Kermit.

I've worked a lot with *PixelPaint,* and it's become my paradigm for paint programs: this is how they ought to work. The Tektronix 4693D thermal printer sitting next to my Mac II produces nice hard copy of those *PixelPaint* images when I really need them — all the 4693D really needs to become a hit is a decent name and a steep price cut — but I'm so enthralled by the quality of *PixelPaint* images on a 19-inch monitor that often I don't want to drag myself back into the real world by reducing those images to paper.

Probably you've fooled with *PixelPaint,* too. Maybe fallen for it as hard as I have. But have you noticed anything about how it performs on your Mac II? In terms of memory requirements and screen-refresh speed? It's a genetic oddity possible only in the world of recombinant Macs: a cross between a pig and a turtle. A pig for memory, a turtle in speed. *PixelPaint* is hopeless with less than two megs. To their credit, the SuperMac people are candid about this; the little piece of paper tucked into the box with the manual and disks says they think it would be just swell if you'd put, oh, say five megs into your Mac II to get the most out of it. I think we could rephrase that just a teensy bit: forget two megs; get at least five megs as openers; and if you're serious about this stuff,

go all the way and get eight megs.

A kindly SuperMac manager told me, when I was struggling last fall with two megs, that as soon as I got up to four or five megs, *PixelPaint* would "fly." He could have said "run," "trot," or even "move along," and he'd still have been exaggerating. *PixelPaint* wants to find *lots* of memory in your Mac, and even when it encounters a full-up machine, it's still not going to fly.

Let me go on to the second program I've found which really uses the Mac II, and plays with that "all the power you'll ever need" theme. That program is the new *PowerPoint* 2.0. Say what you will about Microsoft: They did right by *PowerPoint*. I remember when I first saw a prerelease demo of *PowerPoint* in a roomful of PC-industry hotshots at Esther Dyson's PC Forum in February last year: Everyone in the room was blown away. Finally we had a program which reflected a real understanding of how people who make presentations think and work, what they and their audience need. By the end of April, *PowerPoint* 1.0 was out, an instant hit; three months later Microsoft gobbled it up, and has been rewriting it for the Mac II Era at their graphics-product redoubt in Sunnyvale. *PowerPoint* 2.0 is, simply put, the most impressive combination of power, elegance, and ease of use I've ever seen in a piece of business software. It not only uses color and uses it well, it also virtually reinvents how color *ought* to be used in software. *PowerPoint* lets users apply well-designed color palettes — then at a mouse-click change every slide in a presentation to a new color palette. It exploits the 16.7 million-color palette of the Mac II's color card (you did buy the extra chips, didn't you?) to give gorgeous shaded backgrounds. And shaded backgrounds, with color sweeping from medium to very dark behind the lettering and art, are a signal that we're about to see professionally produced slides.

PowerPoint does all that without losing any of the "presentation smarts" it introduced in the first release, including such touches as printing speakers' notes and "leave-behinds" for the audience.

PowerPoint 2.0 is, simply put, the most impressive combination of power, elegance, and ease of use I've ever seen in a piece of business software. It not only uses color, it also uses it well.

PowerPoint produces beautiful output when connected to a film-based slide maker, such as the Mirus unit. A Microsoft deal with the slide-making service bureau Genigraphics provides a means of getting 35mm slides for those without access to a slide maker — although only through a clumsy template system, 'til Microsoft and Genigraphics get their act together on a Genigraphics driver for your *Chooser* file, due this fall.

But where the new *PowerPoint* 2.0 really stands out is in desktop presentations. With large screen fonts in your System folder and *PowerPoint*'s design and color features, you can build desktop presentations that look like something from network television or Lucasfilm — minus animation, of course. Grab a *PixelPaint* image and stick it into a *PowerPoint* slide show and you'll blow people out of their chairs. Hook up a big SuperMac or RasterOps monitor — or better, one of those incredible $7K Mitsubishi 37-inch color monitors that are starting to show up in boardrooms and training rooms in Corporate America — and you have a system of unbelievable power.

Which brings us back to where we began: raw power. Mac II power, specifically. Of which, as both these programs clearly show, we haven't yet got nearly enough. Want to use *PowerPoint* 2.0 to run a nice desktop slide slow? Great. Just keep hitting the space bar and you can roll from slide to slide. But you'd better work out some patter, like a piano player vamping with his left hand, that lets you pause several seconds between slides. Because no matter how fast you tap that space bar, your Mac is going to take several seconds to redraw the screen for each new slide. Which is one reason you won't find animation in *PowerPoint:* the Mac II can't move long-palette, high-res images around fast enough. *PixelPaint* users have gotten used to these same leisurely screen redraws. Perverse, isn't it, that after the long wait for programs powerful enough to challenge the Mac II, we find the two which best demonstrate why we need machines this powerful also demonstrate that this one isn't powerful enough? Yet.

I have high hopes for 1989's 68030 Mac II. I don't know what they'll call the machine, since Apple will never again name anything the "III"; the pain of the Apple III is still too near the surface. How about the Mac II/30? Or the Mac IV, showing Apple can leap product-release numbers as well as Microsoft? Or with fifties Buicks and Cadillacs and other excesses becoming hot again, maybe the Mac El Grande Mucho Mas? Should we run a little contest here for Apple?

But we don't have to wait for an '030-driven Mac II successor to make these and the other spectacular new programs we're starting to see for the Mac II truly fly. Driving the screen from the same microprocessor driving the computations isn't the right answer, no matter how powerful that chip. We need a graphics coprocessor card for the Mac II. One great advantage of the Mac II's multimaster NuBus is that more than one microprocessor can sit on that bus, each handling its own work. A graphics coprocessor could speed screen redraws phenomenally, providing a huge increase in the perceived speed of the Mac II.

And then, finally, the Mac II would live up to its almost-deserved reputation as a power user's delight, a muscle machine for grown-ups. John Sculley, are you listening?

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BYTE Magazine, Feb., '88

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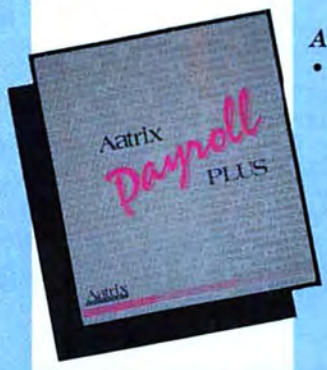
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by Michael Swaine

The Elements of Scripting



One approach to writing a HyperTalk script is to concentrate on getting it to work first and then to write suitable comments to explain what it does. Don't do that. Making the script clear should proceed in parallel with making it work. Write every line of every script on the assumption that it will be read, and don't count on comments to explain a script that can't explain itself.

Does this advice seem extreme? It shouldn't. Scripting is writing, and many of the rules of good writing in general apply to writing good code. One writer on programming style cites the following principles from Strunk and White as good rules of coding:

- work from a suitable design
- be clear
- revise and rewrite
- do not take shortcuts at the expense of clarity
- omit needless words
- prefer the standard to the offbeat
- do not use dialect
- do not overwrite

At the end of this column is a script that formats scripts. It won't really make you a more lucid scripter, but the following bits of advice may. They apply to clear *HyperCard* scripting at three levels: the word, the handler, and the stack.

A WORD TO THE WISE

"Use the right word, not its second cousin." — Mark Twain, *Fenimore Cooper's Literary Offenses.*

The script of Apple's *Phone* stack makes many references to values in fields and to properties of buttons. The names of these fields and buttons tell exactly what's going on: The area code is being prefixed to the phone number, the dialing method is being read off. HyperTalk itself is so much like English that you can make your scripts explain themselves if you name objects wisely.

Use multiword names, and when you do, capitalize the first letter of every word but the first. This excellent convention makes a virtue of the restriction that names cannot contain spaces. You see at once that the name is just one script component, and you can read off the English words as documentation.

Wise use of other words such as *it*, *me*, *one*, and *two* can have subtle benefits. "Get word one of authorBio" is clear, but how about "Put one into count?" One what? Better: "Put 1 into count." Try reading your scripts aloud, or having someone else read them to you.

GETTING A HANDLER ON IT

"As long as it holds together, a paragraph can be of any length." — William Strunk Jr., and E.B. White, *The Elements of Style.*

But it's got to hold together. Henry Ledgard (see below) makes a slogan of it: One procedure, one purpose. The HyperTalk equivalent of a procedure (or paragraph) is a handler. Examine your handlers carefully to see if you can't break out coherent actions into separate handlers. A HyperTalk handler should do just one thing.

Conversely, one thing should be done by just one handler. A popular shareware stack contains two nearly identical scripts. One script extracts scripts from a stack and prints them; the other extracts scripts and writes them to a file. For the three actions (script extraction, printing, and file creation), the author should have written three handlers, saving space and saving the reader the effort of finding the logical structure of the code under the misleading surface structure. The covering laws are:

"No unintentional contrast between two ideas should be allowed to suggest itself," and *"no idea should be presented more than once in the same prose passage."* — Robert Graves and Alan Hodge, *The Reader Over Your Shoulder.*

HOW IT STACKS UP

"The facts in a highly organized novel . . . are often of the nature of cross-correspondences, and the ideal spectator cannot be expected to view them properly until he is sitting up on a hill at the end." — E.M. Forster, *Aspects of the Novel.*

At the stack level, HyperTalk scripting has a novel aspect that most older books on programming style don't consider: The code does not reside in a single program but in interacting scripts. The facts in a HyperTalk stack often are of the nature of cross-correspondences. The plot is in the links. Unfortunately, there may be no Forsterian hill from which to oversee the action. If two or more scripts work together, each script could describe how it depends on the

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other, but this approach might be a mistake.

Consider Apple's *Phone* stack, whose code for controlling the dialing method is distributed among three button scripts and the stack script. The interconnections are nowhere explicitly documented. Nevertheless, an experienced scripter will know that changing the script of one button necessitates changing the others, because that's the convention of how radio buttons work. And the purpose of radio buttons is just to indicate a choice among alternatives, so the button scripts should make no assumptions about what will happen to the information. The button scripts should *not* refer to the stack script. Sometimes logic and convention are the best documentation.

And here is the best advice ever given about writing: *"Read. And read good stuff."* — Jon Franklin, *Writing for Story.*

I list below some good stuff on writing programs. These books deal with efficiency and reliability as well as clarity in writing — and with principles of user-interface design — and they all predate HyperTalk. But they are all stylebooks and all good. I have tried to capture something of the goals and style of each author by a representative quote.

"I need all the help I can get in making a correct program. Informal verification techniques help me write the code and check it before I ever implement it, and testing is crucial after I have the code in hand." — Jon Bentley, *More Programming Pearls*, Addison-Wesley, 1988. Also see *Programming Pearls*, Addison-Wesley, 1986 — the two best books I know of on writing good programs.

"Plan to throw one [version] *away; you will anyhow."* — Frederick P. Brooks, *The Mythical Man-Month: Essays on Software Engineering*, Addison-Wesley, 1975. A classic on software projects, valuable even if you program alone.

"Object-oriented programming is a packaging technology. It packages functionality so that it can be reused." — Brad J. Cox, *Object-Oriented Programming: An Evolutionary Approach*, Addison-Wesley, 1986. A good book on one of the paradigmatic roots of HyperTalk.

"The important image is not the one on the screen, but the one in the user's mind. Spreadsheet programs, for example, only display a portion of the spreadsheet on the screen, but this helps paint the image of a much larger spreadsheet in the user's mind." — Paul Heckel, *The Elements of Friendly Software Design*, Warner Books, 1984. Software design through the eyes of D.W. Griffith.

"Use mnemonic input and output. Make input easy to prepare . . . make the output self-explanatory." — Brian Kernighan and P.J. Plauger, *Elements of Programming Style*, McGraw-Hill, 1978. Useful; inspired by Strunk and White.

"Densely packed screens may overwhelm even knowledgeable users . . . cluttered displays and numerous window commands are a distraction." — Ben Schneiderman, *Designing the User Interface*, Addison-Wesley, 1987. Academic and unimaginative, but sometimes useful.

"A procedure should have one purpose. Purpose is defined with respect to the problem domain by its behavior to the caller." — Henry Ledgard (with John Tauer), *Professional Software, Volumes I and II*, Addison-Wesley, 1987. Densely packed, but not overwhelming.

Schneiderman and Ledgard have also written programming stylebooks inspired by Strunk and White, but the ones I list here are the ones I recommend.

Last month I presented several versions of a script-editing button and asked how you would automate the generation of edit buttons. I *think* it was a trick question whose chief value was in pointing out some limitations of HyperTalk. Maybe I'm wrong, and some reader will show me a safe and simple edit-button generator. But although it is certainly possible to achieve the task I set by modifying the script of the Home stack to intercept card- and background-creation messages, creating new buttons, and pasting the edit script into them, it seems a lot of trouble to go to.

```
-- Script:  Script Formatter
-- Author:  Mike Swaine
-- Version: 1.0 4/1/88

--   This script formats HyperTalk scripts. It breaks
-- lines at a specified length and suggests places to
-- add comments. Its intended use is as a learning and
-- documenting tool for present and future HyperCard
-- stack developers.
--   It produces output that should both run and look
-- good when printed, and it provides means for testing
-- both the function and the appearance of the code.
--   It should be attached to a button, and it requires
-- a second card button and a scrolling background
-- field (with a monospace font) for testing. Both of
-- these should be named "test".
--   Script Formatter is placed in the public domain
-- and may be used freely.
--   This script was formatted with Script Formatter.

-- Formatter's known flaws and how to deal with them:
-- •A concatenate operator mooshed up against a string
-- ("home" &"run") may cause it to break the line in
-- the middle of the string. Bad.
--  Solution: leave spaces between components.
-- •It can't reformat formatted scripts.
--  Solution: always return to the original.
-- •It doesn't work across stacks.
--  Solution: copy the button (and its test button and
-- field) to any stack where you want to use it.
-- •It doesn't rewrap successive comment lines.
--  Solution: enter each paragraph of commentary as one
-- long line.


--   This handler drives the script formatting. It
-- takes care of the user interaction and invokes other
-- handlers to do the actual formatting and output.

on mouseUp
  -- Ask the user for the name of the script to format,
  -- the maximum number of characters desired per line,
  -- and whether the user wants the program to suggest
  -- places to insert comments.
  ask "Format the script of..." with "card button 1"
  if it is not empty
  then
    put script of it into theScript
    ask "Width desired:" with 55
    if it is empty then exit to HyperCard
    put it into theWidth
    answer "Comment help?" with "Quit" or "Yes" or "No"
    if it is "Quit" then exit to HyperCard
    put it into commentHelp
    -- Format the specified script as specified.
```


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AVERY

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```
    put format(theScript,theWidth,commentHelp) into fmt
    -- Show the result both in a field and as a script.
    output(fmt)
  end if
end mouseUp


--   This handler formats a script, breaking lines at a
-- specified length, suggesting places to add comments.

function format theScript,theWidth,commentHelp
  -- This will take time, so show the watch cursor.
  set cursor to 4
  -- Convert theScript into a formattedScript, one line
  -- at a time.
  repeat with i=1 to the number of lines in theScript
    put line i of theScript into theLine
    -- Insert line breaks into any too-long line,
    -- making it a sort of multiline line.
    if the length of theLine > theWidth then put¬
     break(theLine,theWidth) into theLine
    -- The comment help feature is trivial, but is
    -- intended as a suggestion for how you can develop
    -- your own commenting aids.
    if commentHelp is "Yes" and first word of theLine¬
     is in "on,repeat,if" then put¬
      "-- [add comment here]" & return before theLine
    -- Stick theLine onto the end of the
    -- formattedScript you're building.
    put theLine & return after formattedScript
  end repeat
  return formattedScript
end format


--   This handler outputs a formatted script. It puts
-- the script into a field so the user can see how it
-- will look when printed, and into a button script for
-- editing and testing.

on output formattedScript
  -- Put the formattedScript into a field and a script.
  put formattedScript into background field test
  set the script of card button test to formattedScript
  -- Reset the cursor and invoke the script editor on
  -- the formatted script.
  set cursor to 1
  edit script of card button test
end output


--   This handler returns a new version of theLine,
-- with HyperTalk-style line breaks inserted to turn it
-- into a continued line, no component of which exceeds
-- theWidth characters.
```

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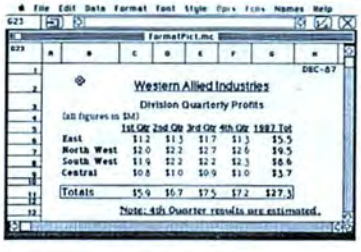
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```
function break theLine,theWidth
  put numToChar(194) into continuedMark
  -- Extract the longest coherent piece of theLine
  -- shorter than theWidth. Leave this in theLine and
  -- put the rest in theRest.
  repeat while the length of theLine > theWidth
    -- If it can't be broken, say why and bail out.
    if the length of last word of theLine > theWidth
    then
      beep
      put "Wider than " & theWidth & " characters:"
      wait 100
      put last word of theLine into the message box
      exit to HyperCard
    end if
    -- Find the character position at which the line
    -- can safely be broken.
    put the length of theLine - the length of last word¬
     of theLine - 1 into breakChar
    -- Break it there.
    put char (breakChar + 1) to (the length of theLine)¬
     of theLine before theRest
    put char 1 to breakChar of theLine into theLine
  end repeat
  -- If theLine is a comment, mark theRest as one.
  -- Don't use the continuedMark with comments.
  if char 1 to 2 of first word of theLine = "--"
  then
    put "--" before theRest
    put empty into continuedMark
  end if
  -- Indent theRest according to the number of
  -- leadingSpaces in theLine. If theRest is (now)
  -- longer than theWidth, break it as well.
  put leadingSpaces(theLine) before theRest
  if the length of theRest > theWidth then put¬
   break(theRest,theWidth) into theRest
  -- Put theLine back together. It now has
  -- continuedMarks and returns within it, and is a
  -- kind of multiline line.
  return theLine & continuedMark & return & theRest
end break


--   This handler returns the number of spaces at the
-- beginning of theLine.

function leadingSpaces theLine
  put 1 into i
  put empty into spaces
  repeat while char i of theLine = " "
    put " " after spaces
    add 1 to i
  end repeat
  return spaces
end leadingSpaces
```

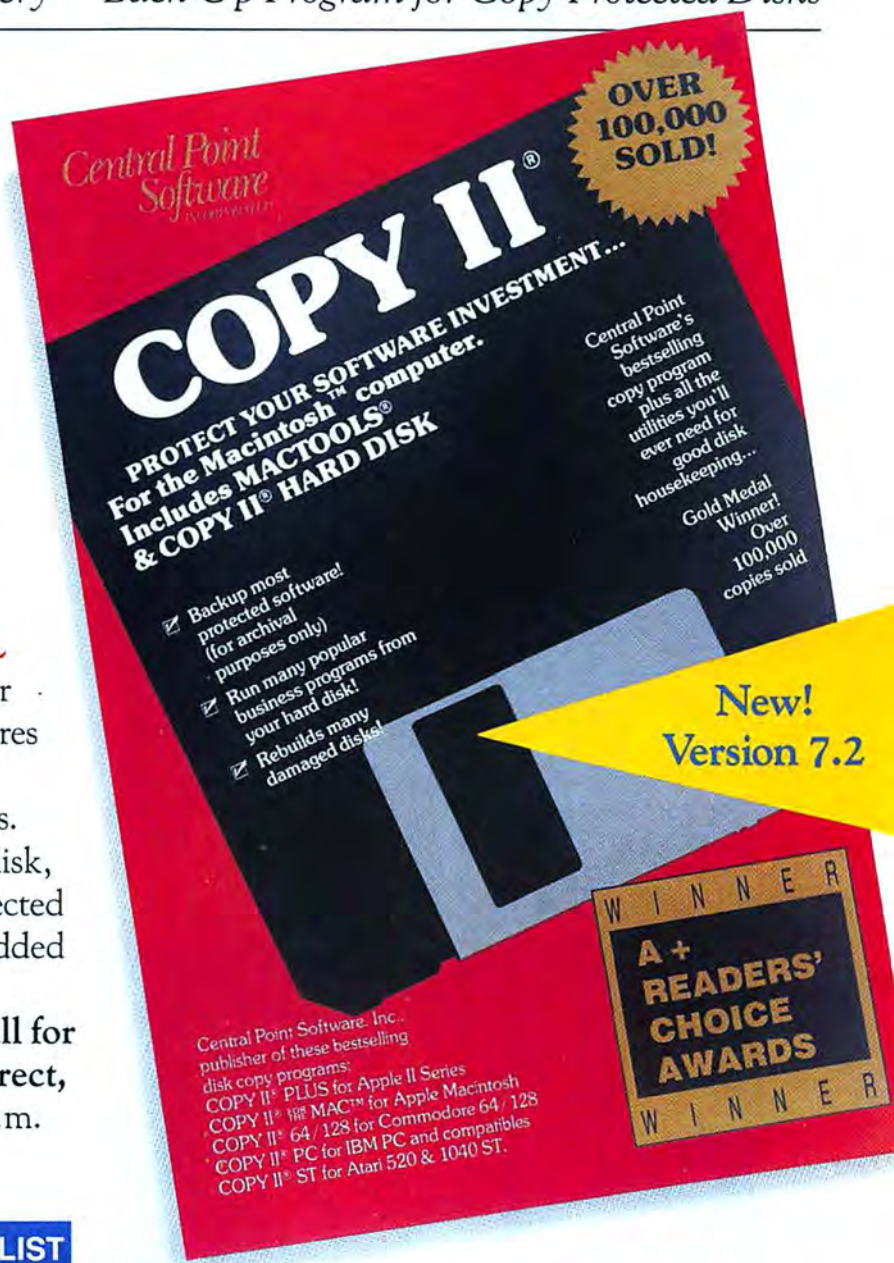
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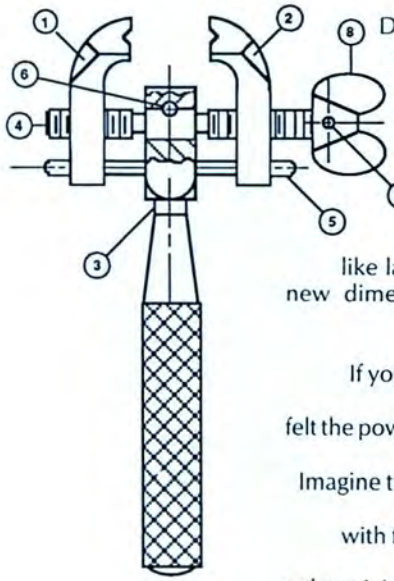
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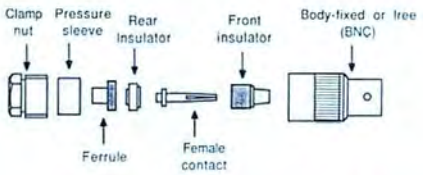
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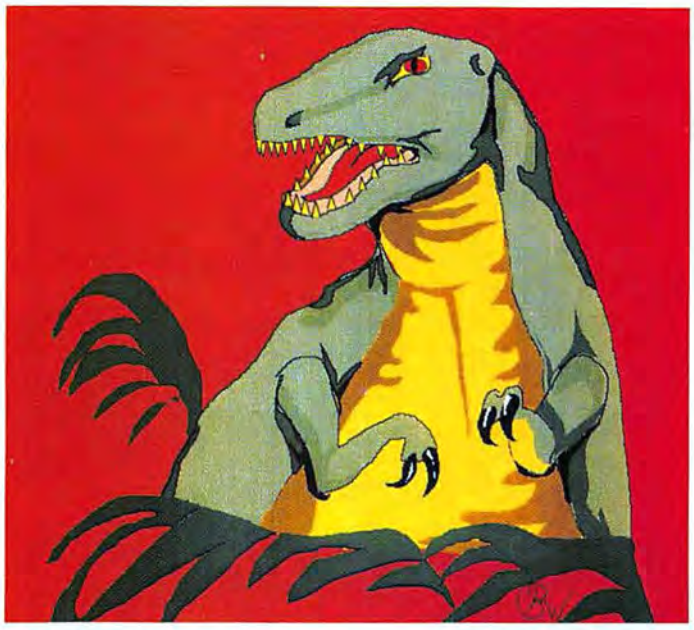
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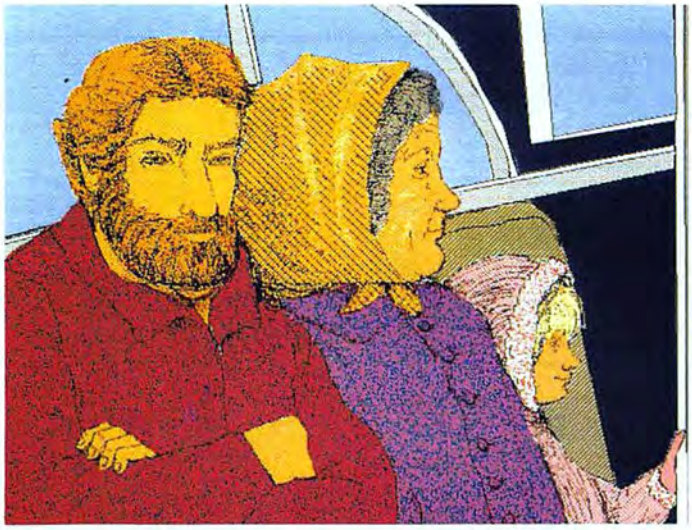


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using draw exclusively



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THE HELP FOLDER

BY CHRIS ESPINOSA

Got a Mac problem? Something that you'd like explained? Something you can't find the answer for anywhere else? Apple's Chris Espinosa takes over from Dan Cochran and will answer your questions every month in this space. When the questions are too tough for him, he'll get the answers from other members of the Mac team. So ask what you need to know and get your answers straight from the source!

Send your questions to Chris care of MacUser, *950 Tower Lane, 18th floor, Foster City, CA 94404. Chris will read all of your questions, but, unfortunately, he may not be able to answer individual queries.*

Nine readers reported that they'd had no trouble using Software Publishing's PFS: File with the Apple system software (System *version 3.2 and* Finder *version 5.3) for the Macintosh Plus, as reported by Robert O. Johnson in the April '88 issue. Fred Beutler of Ann Arbor, Michigan, reports he's using it successfully on a Mac Plus with* System *4.2 and* Finder *6.0, under* MultiFinder *with 2.5 megabytes of memory. He suggests that version A.03B, which he uses, might be newer than Mr. Johnson's version A.03. Mike Whittet reports success on a Macintosh SE; Mark Nash suggests using* Copy II Mac.

Correction For June '88 Help Folder:
In the answer about switching MultiFinder *on and off, the phrase "hold mouse button down" should have read hold "Command key down."*

USING POSTSCRIPT OVER A NETWORK MAINFRAME

Q. Our college has a mainframe network with several laser printers hooked into it, including a couple of LaserWriters as well as some other PostScript printers. Not being able to afford a LaserWriter myself, I want to use the printers on the college's network. I can tie into the network with several communications programs to send files error-free. From there I can spool files to the printers. Doing text files works just fine, but I want to use the Macintosh to its full advantage and do some PostScript printing on the LaserWriters. I could revert to using TeX but would rather not. Is there any way to get files from the Mac into PostScript? Is there a "hold-option-key" option to dump PostScript into a file instead of sending to a LaserWriter? Or would it take some kind of software to do the trick? My comrades here who use IBMs are just basking in the fact that I can't get PostScript printing and they can!

DAN FLETCHER
KALAMAZOO, MI

A. You can spool the PostScript output of any LaserWriter job to a disk file, to edit and print later or to submit over a network to a PostScript printer. First, install the Apple LaserWriter driver into your system, use the *Chooser*, and click on the LaserWriter icon. Close the *Chooser*. Then get into the application you want, choose Print from the File menu, and (with one hand on the mouse and another on the keyboard) click on OK and then hold down the Command and K keys simultaneously. You'll see a dialog box saying, "Spooling PostScript file." The file will show up on your startup disk as PostScript0; subsequent spool files will be named PostScript1, PostScript2, etc. This procedure dumps the complete PostScript you need to print your document into a text file on the disk. You can open, edit, or transmit it just like any other ASCII text file.

The first 29K or so of that file is the *Apple PostScript Dictionary*, a set of commonly used PostScript routines that install themselves inside the printer and remain there until the power is turned off.

It has to be transmitted to the printer in order for it to understand the document that follows.

Once it's been sent and is lodged in the printer's RAM, it needn't be sent again. So once you send your first print job, you can do subsequent jobs by simply clicking on OK and holding down Command and F.

Doing so spools just the PostScript for the document, without the dictionary, and the result is smaller and faster.

A STRANGE, AND STRANGELY LARGE, FILE

Q. I have a Mac SE with the standard internal 20-megabyte hard-disk drive, slightly less than half full. I recently tried out a shareware disk-cataloging program that informed me of the existence of an "invisible file" named InvisHDMainBo3b that occupies a whopping 977K, or 10% of the used space. What is it, and how did it get so big? I remember that right after I upgraded to *System* version 4.2 and was backing up my hard disk I noticed an inexplicable increase of about this magnitude in the number of K in use on my disk. How can I reclaim this space?

JONATHAN ECKSTEIN
CAMBRIDGE, MA

A. It's nice to have a smoking gun to track down some of these questions. That filename led me to the office of Bryan "Bo3B" Johnson, ace programmer and Mac Tech Support guru. (The "3" is silent, by the way.) Bo3b confirms that *HD Backup* creates an invisible file, in

which it records information about when you made the last back-up. Very early versions stored a lot of information there (but only 200-300K — not nearly a megabyte, as you report), and more current versions store only four bytes. That's right, 4 bytes, not 977,000.

So Bo3b says to check out your disk with *Disk First Aid*. Then get a current version of *HD Backup* and do another back-up. That should delete the old invisible file and create a new, much shorter one and free up all that memory. If it doesn't, get a shareware file utility and nuke the sucker.

READING FILES FROM IBM PC AND APPLE II

Q. I am the editor of the Home Economics Curriculum Center at Texas Tech University in Lubbock, Texas. This Center produces home-economics textbooks for secondary schools around the U.S.

The writers of these textbooks are located around the state of Texas. When they send in their copy for review and production, they send hard copy and IBM-compatible formatted 5¼-inch disks.

Since this office uses the desktop camera-ready capabilities of Apple Macintosh SEs, with their 3½-inch disk drives and internal hard disks, I am interested in a software set that will transfer any disk that writers could possibly send. First of all, I am interested in the DaynaFile double disk drive (3½- and 5¼-inch), but I do need more information about it. I have heard that DaynaFile cannot transfer *AppleWorks* files unless they are first written as ASCII files, saved with a pathname, and transferred to 3½-inch disks on the Apple IIGS computer.

JUNE KITTLITZ
LUBBOCK, TX

A. Apple offers the Apple 5.25 drive and Apple *File Exchange* software that'll let you read 5¼-inch MS-DOS diskettes. Have your writers save their information as ASCII files on MS-DOS diskettes, and you'll be able to convert them into files readable by almost any Macintosh word-processing or page-layout application. The DaynaFile does pretty much the same thing, plugs into the SCSI port and shows the IBM PC disk as an icon in the *Finder* — no conversion needed; just drag it over! DaynaFile also handles 3½-inch MS-DOS media in its 3½-inch drive. You can put Apple II 3½-inch disks directly into the Macintosh internal disk drive and convert them with *Apple File Exchange*. Once again, save the text as an ASCII file on a 3½-inch disk and then run *Apple File Exchange*, insert the floppy disk, and convert the files.

I know of no way to convert Apple II 5¼-inch disks directly to the Macintosh; your best bet is to get an Apple IIGS or an Apple IIc or IIe with an Apple 3.5 drive attached. Use *Apple II Utilities* to transfer the files from the 5¼-inch diskette to the 3½-inch disk and then use *Apple File Exchange* to convert.

HYPERCARD QUESTION OF THE MONTH

Q. Employees who use our *HyperCard* database occasionally type a Return character into fields, which, of course, affects our ability to export into *Excel*. How do we compose a script for the export button that removes a Return character? Delete does not work as it does with visible characters in a field. The only way we have found to accomplish this modification involves removing all the text that follows the Return (which removes the Return with it):

```
repeat while field x
  contains return
if field x contains
  return then
delete last char of
  field x
end if
end repeat
```

ROBERT LODGE
OBERLIN, OH

A. Here's a way to join all the lines in a field into one line:

```
put empty into it
repeat with n = 1 to
the number of lines
in field x
put line n of field x
& space after it
end repeat
put it into field x
```

This method concatenates all the lines into one. The **& space** separates the joined lines with a space for readability. You can do this step at the time you export the information or put it in an **on closeField** handler in the field script, with **me** instead of **field x**. This alteration strips out Returns whenever the field is changed and shows you what you'll get at all times.

LASERJET ON THE MAC II

Q. Thanks for your reply regarding the hookup between the Mac II and the LaserJet II, but your information is (at least) half wrong. LaserJet does not work for the Mac II. I was told, by SoftStyle, that *Printworks* would work. That promise was made to me three months ago. The current *Printworks* excludes Mac II from its compatibility list, however.

***ProPrint* is an old software program, so it's highly unlikely that it will work either. I'll be sure and let you know.**

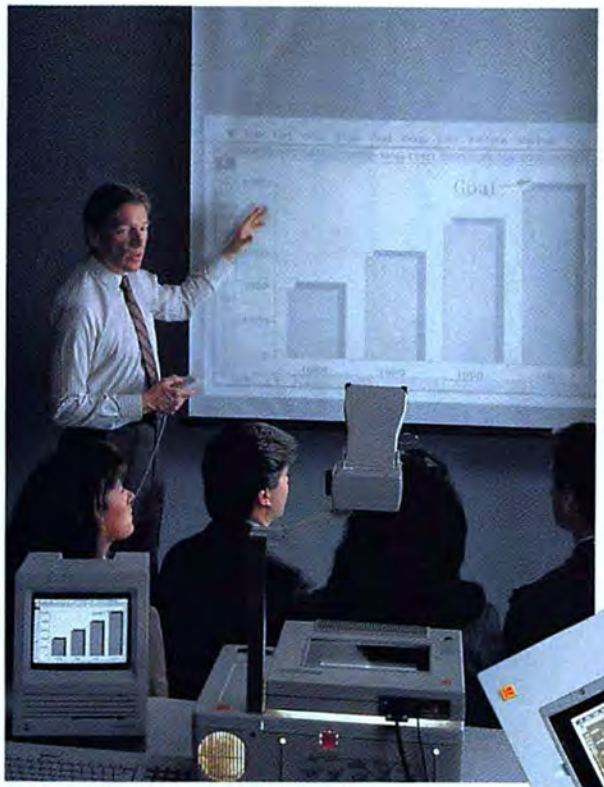
KAI CHU
ELMHURST, NY

A. I checked with SoftStyle and got this answer: "We're using it in-house on the Macintosh II, and many customers of ours are using it successfully on the Macintosh II, but we don't guarantee compatibility with all permutations and combinations of Mac II." You can read into that what you will. A letter the company sent me says that *Printworks* includes a cable suitable for a Mac II and installs onto a Mac II hard disk, but it never says that it actually works. I'd recommend having a dealer who is familiar with your Macintosh II configuration try *LaserStart* and *Printworks* before you buy it.

CAN'T OPEN FILES

Q. I just had something unusual happen, and I wonder if you can offer some insight. While using Microsoft *Word* 3.01 under *MultiFinder* on a fairly new CMS 60-megabyte hard disk, I received a message that the program had unexpectedly quit. At the time I received the message, I was changing the font size. I restarted the program, and when I went to save a revision of a document, I was told that it couldn't be saved under its old name because it was a

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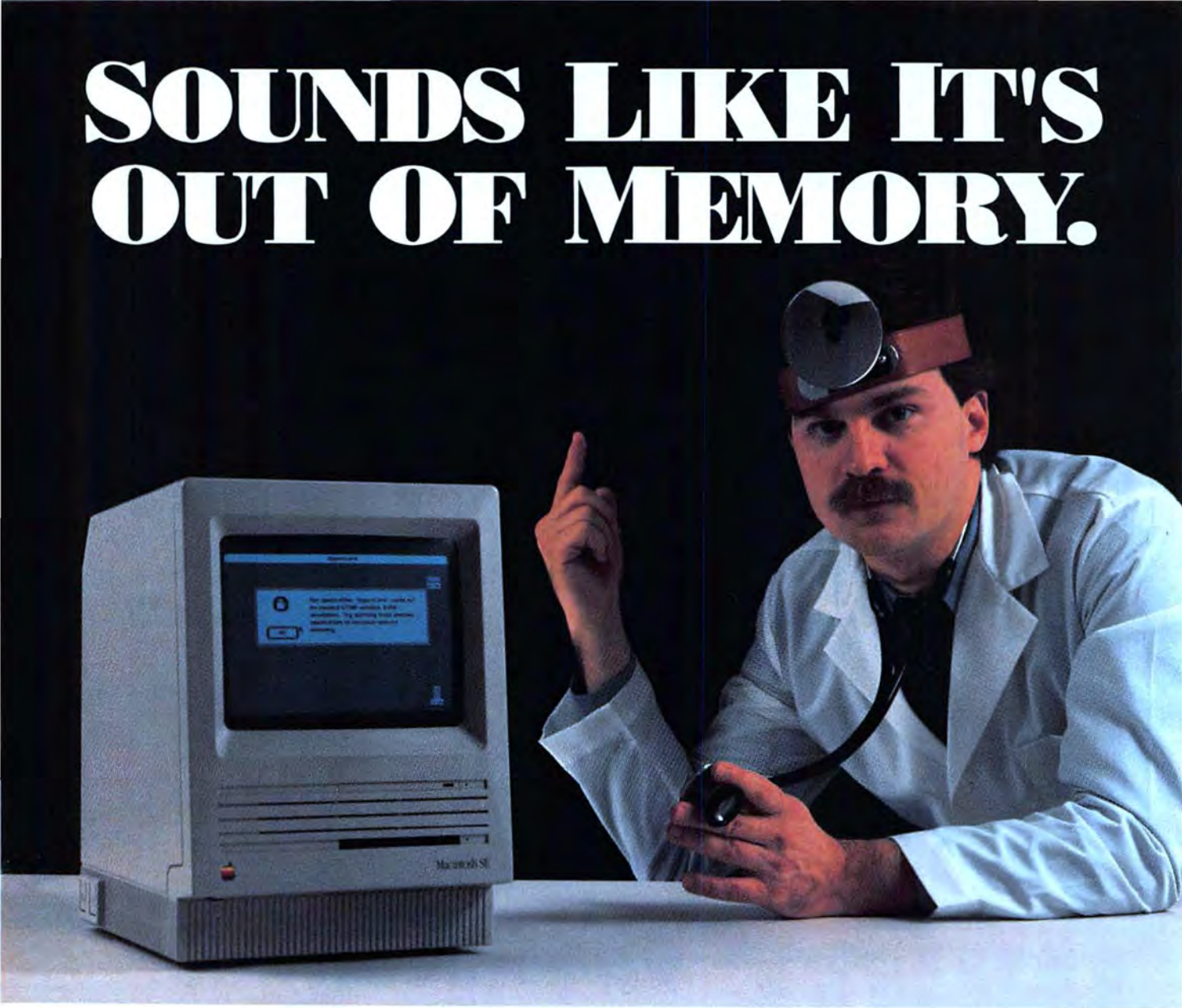
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THE HELP FOLDER

"Read Only" document. Under the Open dialog box, the Read Only box wasn't clicked, and when I looked up Info in the public-domain DA called File Transfer, it wasn't locked.

I then quit the program and restarted it, thinking that directly quitting might help. It didn't. I then opened up other documents in the same folder and had the same problem. I opened up other documents in other folders and had no problem saving them, so I figured the folder had somehow become locked, but, to my surprise, I was now able to save documents in the original folder, including the originally problematic document. This sequence of events occurred even though, only moments before, I couldn't save them, didn't change anything, and didn't quit the program. Any idea of what gives?

MARK SEIGERT
CAMBRIDGE, MA

A. In the pre-*MultiFinder* days, if an application crashed, you had to restart the entire machine. That meant that all memory of what the computer had been doing was erased — which had some good points and some bad points. One of the good points was that the operating system would forget about open files on the disk, because that information was recorded in RAM, rather than on the disk itself. Now, under *MultiFinder*, a crash in one application doesn't crash the entire machine, and you don't have to restart the Macintosh. So most of memory remains intact — which has some good points and some bad points. One of the bad points is that the operating system remembers that a file was open on the disk, although it doesn't remember who opened it, or why.

So what's happening is that *Word* is opening your file and claiming exclusive write access to it. That means nobody else can write to that file while *Word* has it open. Then *Word* crashes. When you restart *Word* and try to open the document again, *Word* asks permission of the operating system to open your file. The OS says, "Sure — but read-only; somebody else has it open for writing." Of course, that somebody else is the previous incarnation of *Word*, which has gone to software heaven. This problem isn't specific to *Word* — it happens with any application that crashes while holding a file open. The real solution is an operating system that remembers which application opened which files. *MultiFinder* doesn't do that. So, for now, you have to choose Restart from the *Finder*'s Special menu to regain the access you had to open files when an application crashes under *MultiFinder*.

SWITCHER ON A MAC II

Q. **I currently use Microsoft *Word* and *Excel* on a Macintosh II. Each program works fine when I run it alone on this machine. When I run them together using the *Excel/Word Switcher* that came with the software, however, I invariably run into the following two problems: (1) If I try to print an *Excel* graphic while running under *Switcher*, the system locks up, with a System Error ID=01. (2) Whenever I quit either *Excel* or *Word* while running them under *Switcher*, the system locks up, with System Error ID=25. This lockup is so severe that I must unplug the computer to get it out of the jam. What's the problem? Have you heard from any other users who have experienced similar travails?**

GARY POBST
CHICAGO, IL

A. *Switcher* was introduced with the Macintosh 512K as a good way to use "all that extra memory" — you could pack three, maybe four 128K applications into the vast reaches of its RAM. Well, 512K isn't all that much memory anymore, software has progressed a bit, and *MultiFinder* now provides the feature people liked in *Switcher:* the ability to have more than one application operational at a time. On the larger screen of the Macintosh II, *MultiFinder* can even let you have the applications on the screen simultaneously. So I suggest that you use *MultiFinder* to use *Excel* and *Word* together on your Macintosh II, not the *Excel/Word Switcher* that Microsoft provided.

BAD BLOCKS ON HARD DISK

Q. **We recently purchased a Macintosh SE with an Apple HD20 internal hard-disk drive. It is running on *System* 4.2 and *Finder* 6.0. The SE and hard-disk drive operate flawlessly, but whenever I use Apple *HD SC Setup***



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version 1.3 to test the hard-disk drive, it fails the test. We brought it to the dealer and received a new SE, which passed the test 15 to 20 times until recently, when it started failing again. When I used *MacTools* version 6.5 to verify the volume, it came up with error -36 in blocks 29438 and 29443. The manual says that *HD SC Setup* tests only the hard disk and not the data. I know that the latest *HD SC Setup* is version 1.5.

Would this make a difference when we're using *System* 4.2 and *Finder* 6.0? Is this test legitimate, or should we be concerned about the hard disk crashing at some point?

F. DAVID ROSE, JR.
CRITTENDEN, KY

A. Well, I'll first warn you that you shouldn't use *HD SC Setup* to test your hard-disk drive. It tests only the electrical and communications interfaces between the computer and disk drive, really; if you want to test the disk itself, you should use the *Disk First Aid* utility that's shipped on the Utilities disk, or one of the public-domain disk-check utilities. Using *HD SC Setup* brings the possibility of accidentally reinitializing your hard disk, which would be unfortunate.

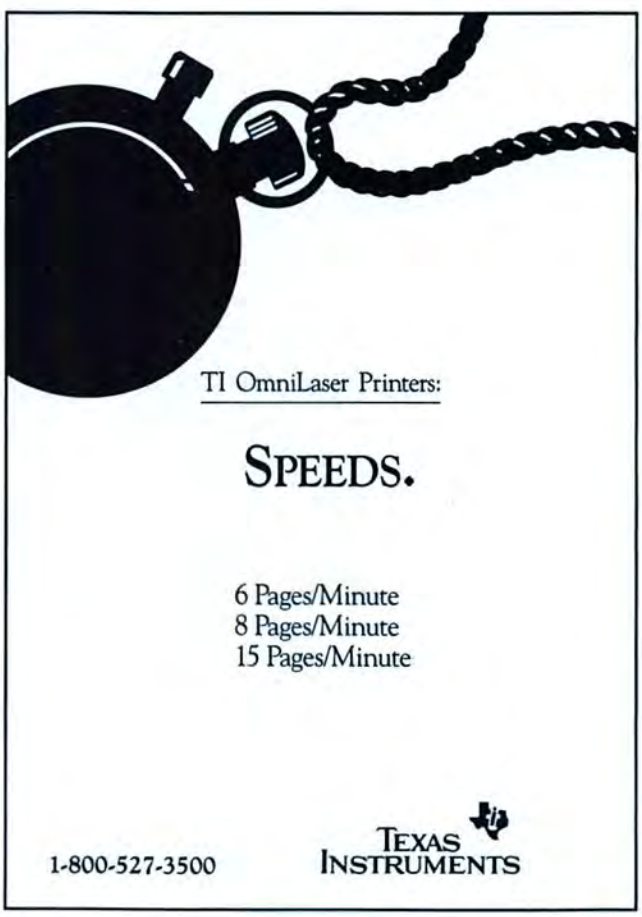
Last month we discussed the block-count problem with *HD SC Setup* version 1.1 and how version 1.5 fixes it. Turns out that version 1.3 had another problem: It turned on a special feature in the disk drive that caused the drive to recalibrate itself every 20 minutes. (This feature was put in by the drive manufacturer for "reliability.") Only problem is, it takes five seconds to recalibrate, and if you try to use the disk during its recalibration, you can scramble a block or two on your disk. This situation comes up only with the Mac SE and *HD SC Setup* version 1.3. That's what's happened: Version 1.3 scrambled those two blocks. I'd recommend backing up your hard disk, reformatting it with version 1.5, and restoring the backed-up files. And use *Disk First Aid* for a confidence check, not *HD SC Setup*.

DISK VERSUS TAPE?

Q. **I'm a new Mac SE owner. The question I have is about subsystems: one being the hard-disk drive and the other being a tape-drive subsystem (½-inch, 9-track). I am looking at both subsystems as a means of mass information storage for my business. Can you give me some pros and cons of the two different systems?**

JEFFERY SYKES
DETROIT, MI

A. Well, disk is faster but holds less than tape, and tape is slower but can hold more, especially because you can change tapes. Most people use a hard disk to hold the software applications they





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use every day; the documents they're working on at the moment; and, of course, their system software to make the machine work. All of these benefit by being on a rapidly accessible medium such as the hard disk. Tape is appropriate for making back-up copies of your disk and, perhaps, if you have special software that facilitates it, extremely large data files that don't fit on a hard disk.

Nine-track tape is cheaper per megabyte than a hard disk, generally, and the tape is removable, but you really need to have special software to deal with its slow access speed. If you like the removability but want the access speed, you might check out cartridge hard-disk drives or "superfloppies" (multimegabyte floppy disks, such as the Bernoulli Box, or Totem II from Bering Industries). They operate with normal hard-disk software and are much faster than tape but are also removable and relatively inexpensive.

WIDE LINES IN QUICKDRAW

Q. I am an experienced Mac user and have just noticed something very bad about my Mac (and yours). It happens with all vector-based drawing programs. Here is the problem: If you draw a line of a precise width, let's say ¼ inch, as I did in *Cricket Draw*, that line shows at that precise width only on a vertical or horizontal axis. If you rotate that line off those axes, it swells to the dimension of the diagonal of the square that is drawing the line — and it also prints that way on an ImageWriter.

Being a graphic-arts teacher, I was very much embarrassed to realize that you cannot be as rigorous in graphics on a Mac as you can on ordinary paper without heavy calculations. What is the cause of this problem? Is it a bad design of QuickDraw?

DANIEL VALLEE
RIVIERE-DU-LOUP, QUEBEC

A. QuickDraw lets each application define the size of the "pen" it uses to draw lines. It does require, though, that the pen be rectangular or square; it can't handle round, oval, or rhomboid pens. Most graphic applications draw with a square pen, and because the length of the diagonal of a square is 1.414 times its width, a line at a 45° angle is about half again as thick as a horizontal or vertical one. "Painting" graphic programs go around QuickDraw and allow a wider choice of pen shapes, and since the accuracy of an ImageWriter closely matches that of the screen, one of those programs might suit your purposes better than a "drawing" graphic program. Of course, only "drawing" programs give you better resolution on a LaserWriter.

(Aha! What about the LaserWriter? It uses PostScript, which uses a concept

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A Memo On The Lures Of Trade



We at *On the Fly* lures want to ensure that the wily, sought-after creatures of the watery world are as captivated with our fishing customers as our customers are with our fine lines of natural, organic hand-tied flies. The line of lures we offer this year will, indeed, reel in customers as never before.

Tackle your fancy.
For the young novice angler looking to launch the hobby with tamer game, *On the Fly* will offer a range of smaller, lighter, less intricate lures, such as the Peanut Piper, the Pumpkin Puff,



the Weedy Wiggle and the Puddle Jumper. These lures are designed for easy handling, both on and off the hook. For the reel man who chums for larger catch, the new additions to our 1989 product line include the Chimmer Swizzler, the FinchDog Fighter, the Man-Boy Behemoth and the Brassy Bottom Bonanza. These additions for 1989, plus the full line of tried-and-true *On the Fly* lures are on the following pages.

Lure, line & sinker.
Our *On the Fly* authorized dealers have long been aware of both our in-store and customer support services. This season is no different. In fact, in addition to our advertising budget, we have plans to expand our in-store displays and re-package the lures for easier inventory and handling.

PROJECTED SALES FOR 1989*		
	CHIMMER	*BONANZA*
100K	NO	YES
50K	YES	YES
25K	YES	YES
10K	YES	YES
5K	YES	YES

Hold the anchovies.
For our customers, we plan to initiate a toll-free 800 number to widely distribute information such as matching lure to fish, bait tips and techniques, hot spots for fishing and spawning cycles. With this service, the fishing line of our market will always be busy.

** SALES FIGURES FOR 1989 ARE JUST A WILD GUESS*

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st Word processing.

ON THE FLY

6308 TROUTMASK LANE, STILLWATER, MONTANA

A Marketing Memo On The Lures Of Trade



We at *On the Fly* lures want to ensure that the wily, sought-after creatures of the watery world are as captivated with our fishing customers as our customers are with our fine lines of natural, organic hand-tied flies. The line of lures we offer this year will, indeed, reel in customers as never before.

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The Brassy Bottom Bonanza



Lure, line & sinker.

Our *On the Fly* authorized dealers have long been aware of both our in-store and customer support services. This season is no different. In fact, in addition to our advertising budget, we have plans to expand our in-store displays and re-package the lures for easier inventory and handling.

Hold the anchovies.

For our customers, we plan to initiate a toll-free 800 number to widely distribute information such as matching lure to fish, bait tips and techniques, hot spots for fishing and spawning cycles. With this service, the fishing line of our market will always be busy.



*Sales figures for 1989 are just a wild guess

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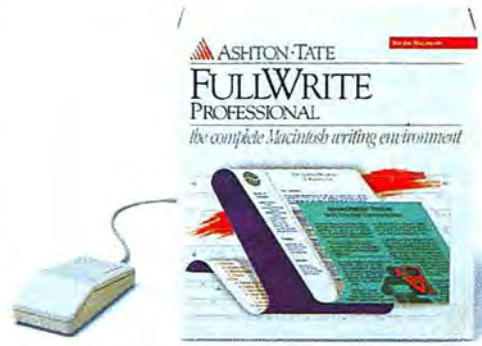
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called paths to get around the QuickDraw problem of rectangular pens. Does it make the lines the correct width? The answer, sadly, is no; to make the LaserWriter output match the screen image and ImageWriter output, the Macintosh fiddles with PostScript to make extra-wide lines on diagonals. So what you see is what you get, even if it isn't what you want.

NOT FOR THE SQUEAMISH

Q. I have a 512K Mac with an external drive. (I'm planning on upgrading to a Mac Plus or a Mac 512KE soon.) I had just created a pinball game with Electronic Arts' *Pinball Construction Set* and launched *MacPaint* to refine it and add graphics. My *PCS* saved-game disk was in the external drive. When I saved the changes, the external drive kept rumbling on as if it were possessed, so I turned the Mac off and rebooted. When I inserted my saved-games disk, a dialog box saying, "This disk is not initialized. Do you wish to initialize it?" appeared. I had no idea what to do, so I clicked on "Initialize." The initialization failed, so I inserted the disk again. A dialog box appeared saying, "This is not a Macintosh disk. Do you want to initialize it?" I clicked on "Initialize." Needless to say, it failed also.

I have several other disks that say the same thing, and the initialization always fails. Every time, they have been in the external drive (although not always with *PCS*).

What's going on here? One disk had valuable business information on it. I would like to know why I'm having this problem and if any programs are available to restore these disks. Thanks.

MATT CARMAN
HUCHINSON, KS

A. Matt, reading your letter was like watching a bad slasher flick. I kept wanting to say, NOOOO! DOOON'T PRESS THAT BUTTOOOONNN! It sounds like your external drive went kaplooey. Take it to a dealer and get it fixed. When it went, it lost the ability to read disks, and the Mac misread that as the disks' being brand-new (that is, uninitialized). So it offered to initialize them for you — initializing means erasing everything on the disk and reformatting it afresh.

Let's hope that your disk drive lost the ability to write disks as well; if not, you've probably wiped out every disk you put into that drive and clicked Initialize on (regardless of whether it said "Initialization failed" — it couldn't tell, because it couldn't read the disk).

Some lessons we can learn: Don't trust valuable disks to a piece of equipment that's making a funny noise. If your Macintosh asks you a question using a word you're not familiar with, check the owner's manual or ask a friend before answering it. If something failed once, it'll probably fail again. And back up your floppy disks: catastrophes don't just hit hard disks. If your drive could manage to write, even feebly, on those disks, it's very unlikely that any information can be recovered from them. But if the internal drive can read them, they're probably OK.

IBM PC QUESTION OF THE MONTH

Q. I recently acquired a Macintosh II with the following additions: Apple PC 5.25 drive, Mac II Hard Disk 40 CPU and *Apple File Exchange*. Prior to purchasing the Mac, I had a Hewlett-Packard Vectra. Although I no longer have the Vectra, I do still have all of the software on the 5¼-inch disks. I'd like to be able to use my existing Vectra software as well as the software I purchased for the Mac. My major concerns involve the use of *Lotus 1-2-3* and *WordStar*.

What can I do to be able to use these MS-DOS files on the Mac?

HAROLD BELTON
PRINCE WILLIAM, VA

A. Well, if you just want to move the data files across, you have what you need (although you might want to get additional *Apple File Exchange* translators to handle the *WordStar* files; try DataViz, (203) 866-4944).

If you want to run your MS-DOS application programs on the Macintosh II, however, you'll need the AST Mac286 card from AST Research at (714) 553-0340. I believe you can even plug your Apple 5.25 drive right into the back of the AST card.

THE THIN GRAY LINE

Q. I recently purchased an Apple 13-inch color RGB monitor. About ¾ of the way down the screen is a straight, faintly visible, horizontal line that is constantly present. My dealer said it represented a one-pixel line defect that is common to all such monitors and that Apple knows about it. The monitors are manufactured by Sony. Although this barely noticeable line does not affect any of the programs that run on the Mac II, it really should not be there.

Have you heard of this defect before, and is there any way it can be corrected?

ZOLTAN P. RONA
TORONTO, ONT

A. That line is the shadow of a very thin wire, much thinner than a pixel's height, inside the cathode-ray tube itself. Inside all color tubes is a shadow mask, a grid that makes sure the right electron beams hit the right color phosphors. In conventional color televisions, the shadow mask has jillions of dots in triangular patterns; in a Sony Trinitron the shadow mask is a vertical grid of extremely fine wires.

In Sony's high-definition Trinitron tubes (one model of which Apple uses in its High-Resolution RGB Monitor for the Macintosh II), a stabilizer keeps the picture convergent at the bottom of the screen. That thin wire you see is the stabilizer, and its job is to keep the image crisp at the bottom of the screen. It's not a manufacturing defect or flaw, and no adjustment or alteration can make it go away. You'll see it on some models of Sony televisions as well.

IMAGEWRITER COMPLAINT OF THE MONTH

Q. I am having difficulty in printing. I have a Mac SE and an ImageWriter II printer. When I print in the Best or Draft mode, the printing is

VISION



INNOVATION



PERFORMANCE



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It was vision that foresaw Mac II performance in an SE shell, but it was a spirit of innovation that produced our 16 MHz Orion™ SE20/16 accelerator board, combining Apple-standard design with logical, optional upgrades, at an incredibly affordable price. And that pattern will be continued with our 20 MHz Orion and our 68030 products, now in development.

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reasonably satisfactory. When I print in the Faster mode, however, the letters are poorly formed. The self-test of the printer produces a satisfactory printout. (I have enclosed a separate sheet printed in the three different modes, with all other factors constant. It demonstrates the problem. Note in particular the poor quality of the *ps* and *qs*. The *ps* do not even print in a consistent fashion. Also note the wiggle in many of the other letters. I would appreciate assistance in solving the problem.

IRVING H. SINAI
EAST BRUNSWICK, NJ

A. The ImageWriter II can print at either 72 or 144 dots per inch and usually prints bidirectionally (that is, when the head is moving left to right, as well as on the return trip). It prints at 144 dots per inch (the Best setting: lots of dots, very finely spaced) by moving the head at half speed and stepping the paper 1/144 inch between the first pass and the return trip. Printing four times the dots takes four times as long, so the Faster setting prints at 72 dots per inch, moving the head at full speed and moving the paper down a full line between the left-to-right pass and the return trip. That's why it's faster. And the characters are less well formed, comprising 75% fewer dots. And another thing happens, which you noticed: The printer can't keep perfect alignment going bidirectionally, and the return trip is occasionally a fraction of a dot off from the first trip across. In the Best mode, since it's overprinting and filling in, the alignment problem is hardly noticeable. In the Faster mode, however, the first trip often prints the body of the character, and the return trip prints the descenders. If these aren't aligned, it's quite noticeable. Your dealer can tighten up the cable, but nothing can keep it in permanent, perfect alignment. So use Best if you want it to look its best and Faster if you want it faster than that.

FASTER SWITCHING

Q. **I am wondering whether it is possible, while using a Mac Plus, to switch between *MultiFinder* and *Finder* — without restarting the system. Such a capability would be invaluable to those of us who are using systems that contain only one megabyte of memory.**

STEPHEN I. MARGLIN
MEDINA, WA

A. By holding down the mouse button while you start up, you can get into the *Finder* alone, regardless of the setting of Set Startup. Once in the *Finder*, you can get into *MultiFinder* without restarting by holding down the Option and Command keys and double-clicking on the *MultiFinder* icon in the System folder. But you can't quit from *MultiFinder* and go back to *Finder*-only operation without RESTART.

REFILLING LASERWRITER CARTRIDGES

Q. **When the ink in a LaserWriter toner cartridge is exhausted, the cartridges can be refilled. Are there any potential problems associated with the use of a refilled cartridge?**

LEON C. NELSON
REDDING, CA

A. Many places offer to refill LaserWriter (and now LaserWriter II) cartridges, and some claim that refilled cartridges are better than original cartridges, contain more toner, give blacker blacks, and so on. There's no problem in using a refilled cartridge. It can't hurt the printer and won't void the warranty or AppleCare. And it's certainly cheaper than buying new cartridges.

But the whole idea behind disposable cartridges is to get rid of the mechanics, which wear out. When you get a new cartridge, you essentially get a whole new printer; which helps make the LaserWriter last for tens of thousands of pages without maintenance, unlike an office copier. If you reuse the same cartridge over and over, eventually it'll wear out and start producing poor copies. Then it's time to buy a new cartridge. But if you can squeeze one or two refills out of each cartridge without sacrificing too much print quality, go for it.

THE CASE OF THE MISSING CHARACTRS

Q. **I am writing in the hop that you will b abl to solv a tchnical problm which has bn troubling m for som tim now. I hav askd various computr frinds and vryon sms stymid by this, and sinc I'm not too tchnically litrate myslf, I must turn to you. A fw wks ago, my Macintosh bgan to run out of "'s." The lttr, "", that is. It bgan as an occasional problm and now has dvlopd into a full-fldgd xtinction. I had th kyboard chckd at th local dalr's and it's fin. The salsman thn told m that somtims Macs just run out of on lttr or anothr, particularly "'s," for som rason which h didn't xplain. H said thy may com back again without warning. Any assistanc you can offr will b apprciatd, as I find this to b a gratr and gratr nusianc. Thank you vry much.**

OWN . DLL
SANTA BARBARA, CA

Q. [*the next day*] **Pleeasee disreegard my leetteer of yeesteerday. No sooneer had I droppeed it in thee mailbox than my Mac deecideed to oncee again providee mee with "ee's." This is veery weelcomee, but you can seeee that I now havee anotheer probleem. Appareently driveen by guilt, thee machinee is now providing two "ee's" for thee pricee of onee. This would bee handy if all I eeveer did was typee words likee beeeekeeeeping and geeeek and beeeerbeelly. This, I feear, would limit my creativity too much. So, oncee again, I reequeest your ablee assistancee. You may reeply at the abovee addreess.**

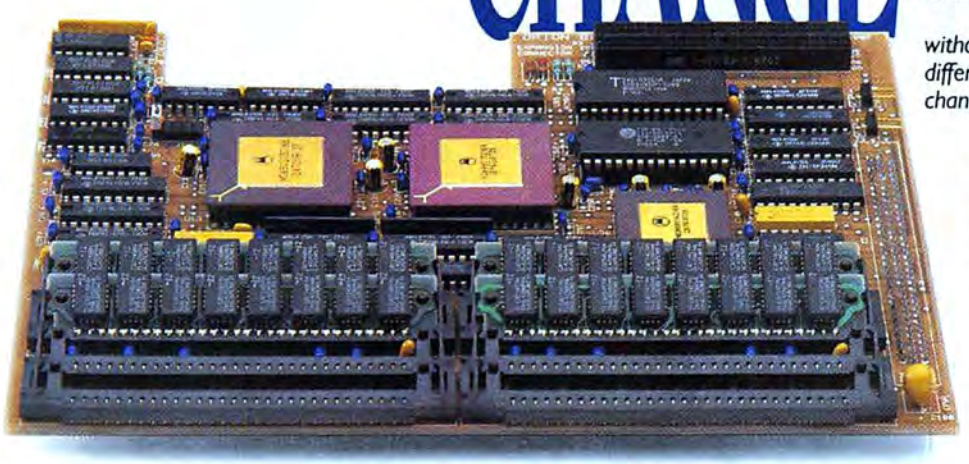
OWEEN EE. DEELL

A. They don't run out, Owen, they just get tired. Of course, "e" being the most common letter in English, I'm not surprised that it went first (I know some people who'd wear out the exclamation point before that). Your Apple dealer can order individual keyswitches as service spares from Apple (just mutter the magic incantation 705-0070). If you're quick with a soldering iron you might be able to do it yourself; if you're in warranty or rusty with hot metal things I'd recommend cajoling the dealer into doing it for you.

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It's the only board available that gives your SE all the power and memory expandability of a Mac II. And like all innovations from MacPEAK, the Orion SE is 100% Apple-compatible, which makes it easy to install, easy to expand—and very easy to appreciate.

FROM SE TO MAC II IN NOTHING FLAT

With a blazing clock speed of 16 MHz and full 32-bit busses, the Orion SE20/16 quadruples the processing speed on all your software. If that's not fast enough for you, an optional boost to 20 MHz is available (call for price on this option). Or, add a 68881 Math Co-processor and run math-intensive software and desktop engineering programs up to a hundred times faster than a standard SE! ($295 option)

Equipped with Apple-standard SIMMs, the Orion SE is designed for easy "snap-in" upgrades of 1 to 8 megabytes of on-board memory. Plug in a Galaxy™ LS option ($490) and your SE is instantly compatible with a variety of large screen monitors, including landscape and portrait formats.

The 68851 Memory Management Co-processor ($595 option) allows the Orion SE to handle up to 32 MB of memory, as well as advanced operating systems like A/UX and multi-tasking systems.

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More power and speed. Greater flexibility. Total compatibility. With the Orion SE, your SE works harder, faster. Better.

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ORGANIZATIONAL TOOLS

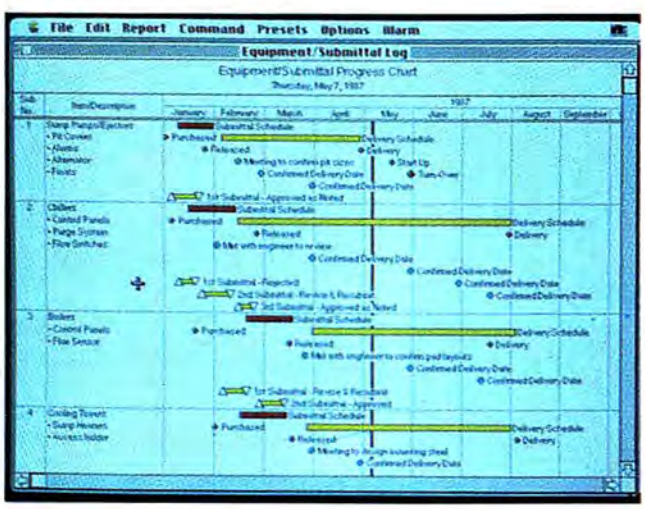
AEC INFORMATION MANAGER



If you're the kind of person who ran out and got one of those popular organizer notebooks — the kind you put together by picking the forms you want to add, one pack for car expenses, one for addresses, another for goals and objectives — and thought it would make your life easier, take a look at *AEC Information Manager*. It's made just for you, dedicated to holding and retrieving the kind of information gathered by anyone who manages projects. Date calculations and scheduling graphs are available on demand, and forms are provided to track project progress from start to completion.

Information Manager is a specialized flat-file database with built-in alarms to remind you when something is due. It easily transfers information to or from other databases. Normal Text, Number, Time, and Date fields are supported as well as special fields for project management. A predefined Address field contains subcategories typical of almost any address. If an entry is longer than 45 characters, then the List Of Field and Note Pad fields compensate for the extra length.

The Project Log and Submittal Log fields contain what you'll need to track paperwork as it moves through its normal distribution list. Sequence and Calculation fields are planned for future releases and appear as grayed-out buttons. User-definable fields are not available, although they would improve the program's usefulness substantially.



Reporting is not very flexible. You make selections on four screens and generate a report over which you have little graphic control. No full font support is provided; reports can be printed only in predefined sizes of Geneva, Helvetica, and Chicago.

Time calculations are performed automatically, given start time and project duration, and can be based on calendar dates and times or dates and times during which business is conducted. A built-in work calendar keeps track of typical days for each day of the week and can handle exceptions for holidays and special events on a daily basis.

Printed schedule graphs are simple to generate, but no scheduling algorithms are built in. Resource allocation still must be handled either by hand or by another program, such as *MacProject*.

Alarms are a separate menu that might as well be a separate program. They aren't integrated with other features, and you won't know whether an alarm goes off unless you have the program running.

Someone may have to send the Apple Interface Police to the AEC office for bending, and sometimes breaking, the standard interface in a few very serious ways. Under *MultiFinder*, *Information Manager* takes over the whole desktop. Select the program and the windows belonging to all other programs disappear. This action was "legitimized" by *HyperCard*, but it still violates the Mac's karma. Rather than clicking from window to window to switch between programs, you're forced to select program names from the bottom of the Apple menu below the QUIT command. (You should always use the QUIT command last!)

Overall, *Information Manager* is easy to use and is suited to the market it was made for: middle-level paper pushers. It is poor at solving general-purpose database problems. Any of several generic database programs are easier to use. But *Information Manager* integrates time and event tracking with data manipulation in a special and useful way. The program would be a reasonable choice if it sold for less than a third of its current price; don't even consider buying it for more.

AEC Information Manager
★★½
List Price: $695.
Published by: AEC Management Systems, 20524 Amethyst Lane, Germantown, MD 20874; (800) 346-9413 or (301) 428-3694.
Requires: 1 megabyte. Version 1.21 reviewed. Mac II and *MultiFinder* friendly. Application size 319K. Not copy protected.

— *Linda Custer*

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Quick Clicks

DATABASE

GEOQUERY

Almost everyone keeps an address book — a handy little thing but limited too. You can only structure your records alphabetically. A database helps, but the fields are often too broad. Sort your New Jersey customers by state, for example, and you'll mix the New York suburbs with those near Philadelphia.

GeoQuery offers an alternative. It turns the problem upside down and lets you look at any data containing address information from a geographical perspective. *GeoQuery* uses five-digit Zip codes to put on-screen pushpins up on a map. Atlases for the continental U.S., Alaska, and Hawaii are included. Others, offering more detailed views of regions, states, and counties, are available separately. There are also optional Atlases for specialized markets, such as Areas of Dominant Influence and Designated Marketing Areas (both of which define television markets) and Metropolitan Statistical Areas (which defines urban populations according to the U.S. census). Although *GeoQuery* creates maps, cartography is not its purpose. Rather, it's a tool that analyzes information to provide new insight into your database.

Open an Atlas and *GeoQuery* constructs a basic map that you can use "as is" or customize. *GeoQuery* maps are composed of Regions, Shapes, Landmarks, Legends, text labels, and Pushpins. These elements exist in a multilayer, object-drawing environment that can be as large as 22 X 22 inches.

Regions are the immutable geographic elements that make up the map. Shapes, created with the drawing tools, can be moved about and are used to select map sections for analysis. Landmarks are points permanently affixed to the map. Legends give the scale of the map and reference information for the data being displayed. Pushpins are the symbols (attached to a physical location on the map) representing the records in your database.

Select a Region or a Shape, and *GeoQuery* presents a quantitative report detailing the attached records. Double-click on a Pushpin (with the Snooper tool) and the individual record is displayed. Stretch the Ruler between any two points and it shows the distance from one to the other. You can print out the maps and reports generated with the program as well as the individual records represented by Pushpins. And on the Mac II, you can display map elements in color for greater emphasis.

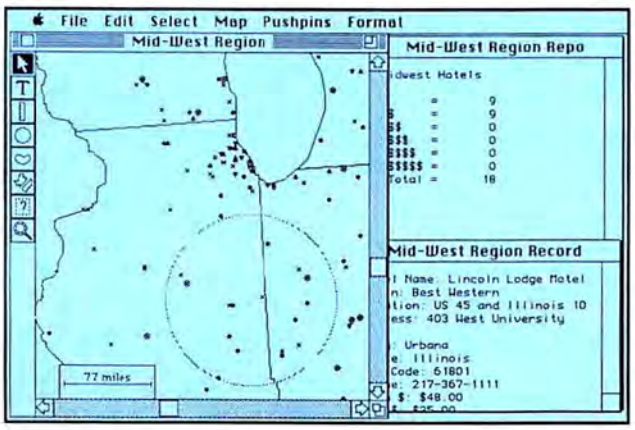
You create specialized maps by deleting unwanted Regions and rescaling those remaining. You can divide or merge Regions and create custom Regions by combining Shapes. You add Landmarks to the plot by entering their Zip codes or by converting Pushpins.

GeoQuery makes no provision for entering records from the keyboard. You must load all data from the Pushpin menu. You must either already have an appropriate database (with Zip code information) or create it first on a suitable database product. *GeoQuery* reads ASCII text files, so you can use any program that saves files in this format to build databases. To import them properly, however, data fields must be tab-delimited.

Once in *GeoQuery*, you can manipulate data to reveal different relationships. Choosing Profile lets you change sort fields. The SHOW PINS command provides another level of visual sorting by turning individual categories of Pushpins on or off. So, if your database has the basic information, *GeoQuery* answers questions such as: How many customers within a 50-mile radius of Cleveland have purchased widgets?

The maps that come with *GeoQuery* are nice enough, but they lose geographic accuracy and detail when you plot small areas. At scales of less than 10 miles per inch, the program does not display some boundary lines. This doesn't compromise the integrity of the information, but it does affect a map's visual appearance. If you need to map your database to geographic areas smaller than an average-size state, look into the specialized Atlases. Customizing maps to your particular needs requires an understanding of *GeoQuery*'s tools and multilayer drawing environment.

GeoQuery's manual emphasizes the program's usefulness as a travel planner. Its utility in this role is completely dependent on the availability of the proper information. Unless you keep a working database of hotels (such as the one in the tutorial example), you won't use *GeoQuery* to plan trips. What *GeoQuery* can do is let you see the geographic profile of the records you do keep. If your business can benefit from this kind of perspective, *GeoQuery* will be a useful addition to your database-analysis tools.



GeoQuery

List Price: $349.
Published by: Odesta Corporation, 4084 Commercial Avenue, Northbrook, IL 60062; (800) 323-5423, in IL (312) 498-5615.
Requires: 1 megabyte and two disk drives. Mac II and *MultiFinder* friendly. Application size 329K. Version 1.0 reviewed. Not copy protected.

-Carlos Domingo Martinez

GRAPHICS

MACPAINT



MacPaint is the original Macintosh toy. Early Macs came with it, and everyone played. Sure it was fun; it was also powerful. More than any other program, it demonstrated the Mac's potential. But like all toys that get a lot of use, *MacPaint* began to look frayed. *FullPaint*, then *SuperPaint* and *GraphicWorks*, superseded it. That, and the evolution of the Mac itself, mandated a new version.

At long last, *MacPaint* 2.0 has arrived from Claris, the independent company spun off from Apple to market software. The "new and improved" *MacPaint* fixes most of the original's shortcomings, adds some interesting new wrinkles, and still retains the look and feel of its ancestor.

Version 2.0 supports up to nine open documents at the same time. Naturally, available memory determines the actual number. Windows are now resizable up to the full 8-×-10-inch size of a *MacPaint* document and, if smaller, will automatically scroll. Tools and Palettes reside on menus that you can "tear off" and place anywhere on the screen.

A Zoom tool, with five steps from 50% (reduced view) to 800% (FatBits), has been added. You can invoke it from the menu (as you do FatBits) or with a Command-M or -L. Also, a Command-click and Command-Shift-click with the Pencil zooms you in or out. At 800% magnification, a small normal-view window appears for reference.

The Grabber is always available with the Option key. You can draw circles, ovals, rectangles, and squares from their centers as well as from corners. Squares and rectangles can have different vertical and horizontal line weights.

The selection rectangle now disappears so you can move image segments and place them more easily. A Mouse Position window gives precise readouts of cursor location, and you can set grid lines at 2-, 4-, 8-, 16-, or 32-pixel intervals. The most significant new features, though, are the Snapshot, the Magic Eraser, and Stationery Documents.

The Snapshot is a kind of "global" undo. It creates a duplicate of your working image in memory, providing an intermediate step before executing a REVERT TO SAVED. When you open a document, an initial Snapshot is created automatically. With new documents, you must actively take Snapshots. Then, as you work, you can return all or part of the image to the Snapshot version. Every open document can have one Snapshot associated with it at any time. Subsequent Snapshots will replace those taken before. If more than one window is open on a 512K Mac, however, there won't be enough memory for a Snapshot.

MacPaint 2.0's Magic Eraser is also an undo tool. When used with the Command key, the normal Eraser becomes "magic," giving it the power to restore the pixels it has just erased. Its magic is, of course, derived from the Snapshot image. Used in conjunction, the two features provide great editing flexibility.

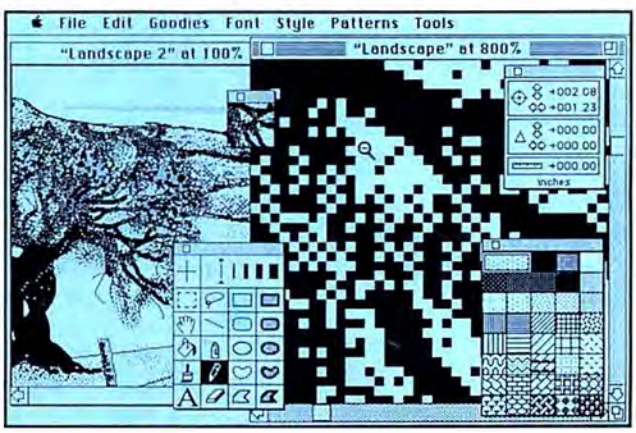
Stationery documents are *MacPaint* images with formatting information preserved. Page setup, menu positions, and user preferences are all recorded by this option. Its primary value lies in the creation of design templates that you can use recurrently.

MacPaint 2.0 performs very well. It retains the intuitive simplicity that made the original a breakthrough while adding improvements and enhancements. Although Version 2.0 brings *MacPaint* into the second generation of Paint technology, it doesn't leapfrog it into the third.

Among the missing features (which are available in *SuperPaint* or *GraphicWorks* 1.1) are true multilayering support for graphic "primitives," rulers, a visible grid, and high-resolution painting. Also absent is the ability to read other file formats (only *MacPaint*, Startup Screen, and Stationery can be opened directly). Selections can (still) only be rotated counterclockwise in 90° increments. And there is no support for color display or output.

Finally, there's the question of value: Should you shell out $125 for a program that used to be *given* away? Well, certainly, all registered users should take advantage of Claris' $25 upgrade policy. At that price, *MacPaint* 2.0 is an incredible bargain.

Those starting fresh should consider their needs. *MacPaint* 2.0 has a good complement of features, but there are other programs that do more. Still, now that Mac software prices have begun to go "upscale," *MacPaint* 2.0 is the lowest-priced (though not by much) second-generation program. In that context, and given its solid operation, it has to be considered a good value.



MacPaint
★★★★½
List Price: $125; $25 upgrade fee.
Published by: Claris Corporation, 440 Clyde Avenue, Mountain View, CA 94043; (415) 960-1500.
Requires: 512K and two disk drives. Version 2.0 reviewed. Mac II and *MultiFinder* friendly. Application size 147K. Not copy protected.

-Carlos Domingo Martinez

Quick Clicks

NUMBER CRUNCHING

101 MACROS FOR EXCEL



The publisher of *101 Macros for Excel* is so sure of its product that it's offering a 60-day money-back guarantee if the software doesn't let you "make a quantum leap in your use of *Excel*." For the most part, that confidence is justified. *101 Macros* gives you all the power of macros without making you learn how to write them.

The 400K disk contains only three files: an introduction to *101*, a demonstration macro sheet, and the file that contains the 101 macros. The demonstration macro whets your appetite for what's to come. You get an immediate sense that some thought and craftsmanship went into the code. In fact, there's quite a bit of code in the single sheet that holds the macros. I was surprised to discover nearly 1300 rows of code, neatly arranged.

There are macros for all tastes and needs. The Zero To Blank macro, for example, actually deletes formulas when the value of a cell is zero. My question is: Why cannibalize a worksheet when a number format can zap blanks for you? On the other hand, there is a very nice macro to transpose row-wise data into a column. There are also macros to adjust the value of a range by some constant or to average all the numbers in a column.

Many macro statements show an advanced knowledge of *Excel*, demonstrating ways of making more efficient use of the commands. Several clever macros exploit little-known features. A Test and Replace macro looks for a value and changes it to another value. The Go/Return macros toggles between cells in a large spreadsheet. There's even the proverbial Biorhythm macro to chart your emotional, physical, and mental cycles.

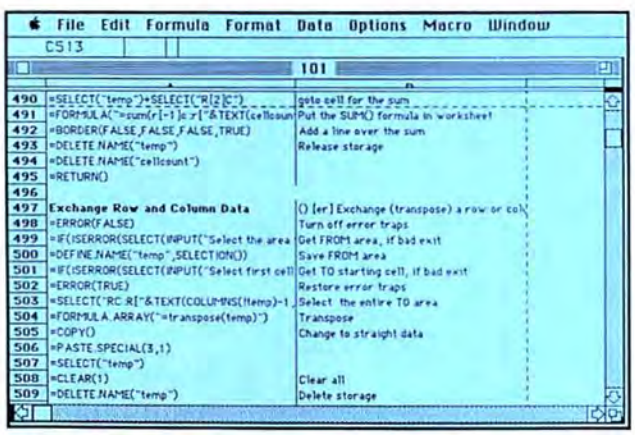
Most of the macros have an Option-Command keystroke plus a "shorthand" command that is used with a special macro runner. This second runner option shows an alternative method of developing a user interface in *Excel*.

The manual does a poor job of representing what is on-disk. The small, spiral-bound manual covers all the required basics in the early chapters. Following an introduction is a description of how to install and use macros. There's a brief discussion of what macros are along with a simple demonstration on how to write a macro. But these early chapters are cursory at best — good only to get beginners started.

The remainder of the manual is a series of chapters organized by functional type, such as format, cursor control, display macros, and so on. In each of these chapters, several macros are named, and a very brief description of the macro's function and operating instructions is given.

For macro novices, heavy macro recordists, and even those of you who have cobbled together small macros from scratch, this set has a lot for a low cost. If you're an experienced macro technician, paying the street price for this collection of macros is probably a small fee for what may become a useful addition to your macro research library. This collection is clearly aimed at a novice-to-intermediate audience, though. You will probably have worked out your own solutions to several of the design problems that the package addresses.

I'd recommend this set for most *Excel* users. The greatest benefit is to intermediate users; novice users might not find the format of the manual and macro sheets well enough integrated. If you're comfortable cruising around a macro sheet, though, you'll probably find a few gems that you'll use again and again. Give it a shot.



101 Macros for Excel

List Price: $69.95.
Published by: Macropac International, 19855 Stevens Creek Boulevard, Suite 168, Cupertino, CA 95014; (800) 624-0077, in CA (408) 996-8143.
Requires: Microsoft's *Excel*. Not copy protected.

— Louis E. Benjamin, Jr.

PERSONAL FINANCE

MACMONEY



"Mature" is an appropriate description of *MacMoney* 3.0, the latest upgrade to a program that started out "pretty darn good." *MacMoney* is a financial manager that gathers its data primarily from your checkbook entries. This update includes 11 major changes and a few more minor, cosmetic modifications.

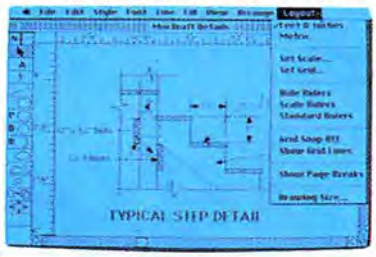
Each *MacMoney* entry is assigned to 1 of up to 250 categories, such as bank accounts, expenses, income, assets, credit cards, cash, or liabilities. Using information gleaned from your checks and deposit slips, the system produces a variety of reports and graphs such as balance sheets, financial reports, transaction activity reports, and income and expense statements.

Like many people, I keep an investment/money-market-type account in addition to a regular checking account. Where I ran into problems using the previous version of *MacMoney* was in transferring funds from one checking account to an-

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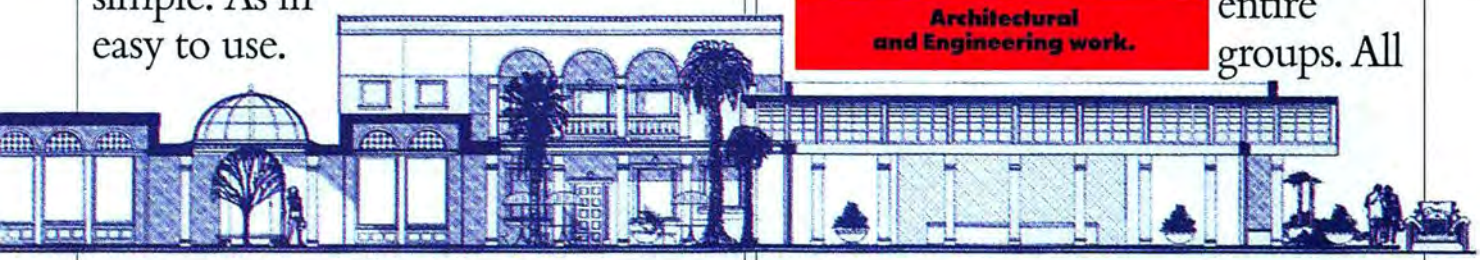
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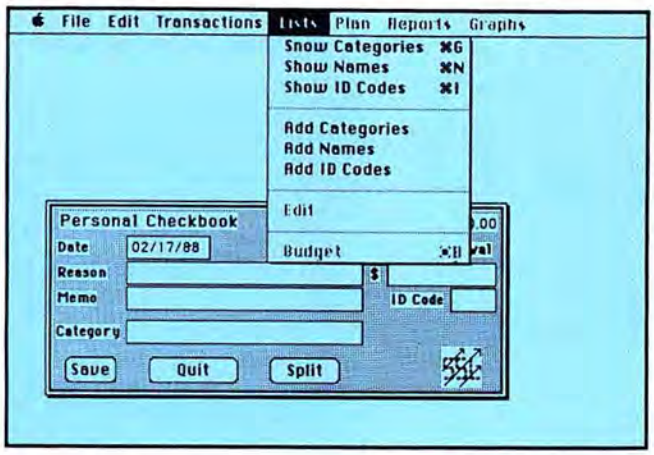
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Quick Clicks



other. If I entered the transaction in both accounts (one was a deposit, the other a withdrawal), the balances in both accounts ended up severely out of whack. Apparently I wasn't the only one who had this complaint, because Version 3.0 now records both transactions so that they appear on the check registers of both accounts. So now when I deposit funds from another checkbook, the transaction shows up on the other account, where I can edit it as needed.

Another major improvement is that *MacMoney* now sorts registers (lists of checks and deposits) either by transaction date or by check/deposit number. This helps quite a bit when items are out of sync chronologically — something that happens to me quite often.

MacMoney's third improvement is in assigning budgets. You can select the Enter Balances button from the Category menu to display last year's budget for comparison with the current year's.

Other changes include two new default categories: Delete and Void. In previous versions, once you entered a transaction, it was there forever. You could change the amount to zero, but the transaction had to be assigned to a category. I used Misc.In and Misc.Out as my dumping grounds.

The new Preferences screen customizes input and output, including the way items are sorted in the register and the position of the cursor when you enter transactions (date or name/source, for example).

Running on a Macintosh II, *MacMoney* produces graphs in color. It displays the checks in yellow, cash receipts in green, and credit cards in red. All data entered with earlier versions of *MacMoney* are compatible with Version 3.0.

MacMoney's newest documentation is an improvement over the previous manual, but it still misses the mark. First, the reference section has been organized according to *MacMoney*'s menus and submenus. This may be logical, but it requires you to memorize the menu in order, which just doesn't work for me. Also, the pages have no headers, so you can't just flip through to find a topic. Finally, the index doesn't match the text exactly — it's often off by a page.

What the documentation needs, even more than better organization, is more information about how to use *MacMoney* to handle routine problems such as withholding. I finally decided to enter the total amount of the deductions as a cash deposit and then subtract each deduction as a separate cash transaction. After all these years of using *MacMoney* and its predecessors, I still don't use the assets and liabilities sections effectively.

As good as *MacMoney* is — and it continues to be the most powerful and easy-to-use program of its type that I've seen — there are still areas for improvement. In some future version, I'd like to be able to add a memo for each item in a split transaction. Also, although I'm glad I can "unsplit" a transaction, I'd like to be able to go back and split a transaction after it's been saved. I'd also like to be able to choose which data the system should use for budget totals when I start a new year. But despite some heavy competition, *MacMoney* continues to grow and mature into a worthwhile personal finance program. Now, if it could only beep when I enter an incorrect amount from my checkbook . . .

MacMoney
$$$$
List Price: $119.95.
Published by: Survivor Software Ltd., 11222 La Cienega Boulevard, Suite 450, Inglewood, CA 90304; (213) 338-0155.
Requires: 512KE and printer; external disk drive or hard disk recommended. Mac II and *MultiFinder* friendly. Application size 296K. Version 3.1 reviewed. Not copy protected.

— *Bonnie Walker*

ORGANIZATIONAL TOOLS

SUPEREXPERT



Artificial Intelligence (AI) is a major topic of discussion in many *Fortune* 500 corporations. Most discussions focus on expert systems, which are designed to emulate the knowledge and advice of human experts. With AI languages such as LISP and PROLOG, they are developed with mainframe expert-system shells and are delivered on microcomputers with scaled-down versions of these mainframe products. One of the most scaled down of the expert-system shells is called *SuperExpert*.

At first glance, *SuperExpert* appears to have all the right credentials. But *SuperExpert* is old technology. Its advantages and disadvantages both stem from its basic design: the Concepts Learning Algorithm (CLS).

CLS was devised by Earl Hunt in 1966 and was extended into ID3 by Ross Quinlan in 1979. The version of this algorithm employed in *SuperExpert* is dubbed ACLS. Basically, what this means is that *SuperExpert* induces rules from examples. The system designer states a series of examples that represent solutions or nonsolutions to a problem. The program then derives rules from these examples and allows the user to query the system for answers based on these rules.

This sounds easy, but simplicity is also the program's greatest drawback.

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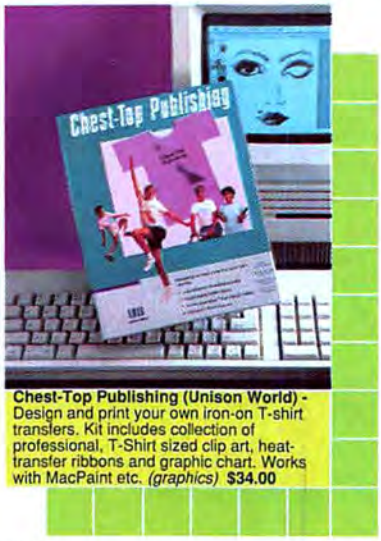


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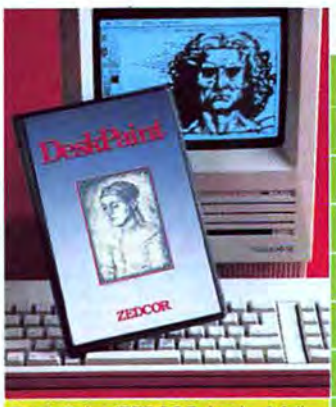


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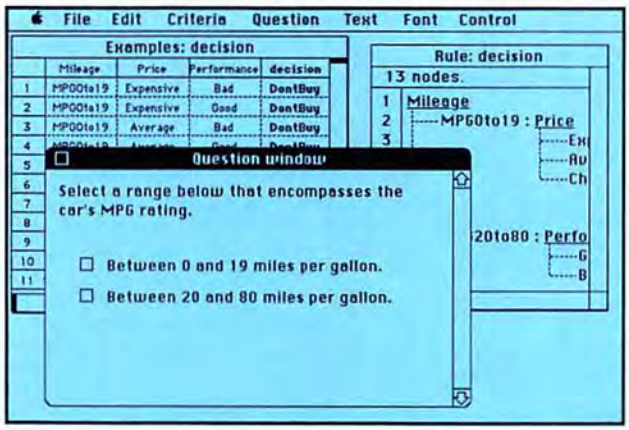
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Quick Clicks



Induction systems work well when a single type of knowledge is being represented. They help focus the user on developing exception data and thus hone the advice they provide. On the other hand, they create astronomical sets of examples.

SuperExpert employs a spreadsheet format for knowledge entry. Column headings label the criteria, and rows contain the examples. The limited types of criteria render *SuperExpert* problematic. You can enter only three types of information into criteria: Logical (meaning text), Integer, and problems.

Logical information is well and good if you're using one-word examples, but even the data illustrations in the manual, such as MMPG0to19 betray the weakness of *SuperExpert:* its lack of user control over the rule set. In a production-rule, expert-system shell this might be written as: Do miles per gallon range from 0 to 19? *SuperExpert*'s cryptic coding is necessary because the rule generator must treat each criterion as a single instance. *SuperExpert* gets around this deficiency by allowing the user to edit text associated with a criterion. The miles-per-gallon situation may be presented as: Select a range below that encompasses the car's MPG rating with buttons for the ratings. The text manipulation is a clarification feature, but it's unnecessary in a rule-based system. Integers are the only numerical types available to *SuperExpert* users. This translates to a lack of fractional or decimal numbers such as 2.5 and 3.7.

SuperExpert, despite its shortcomings, has a place in the expert-system world. *SuperExpert* and other induction expert-system shells are good for simple problems and can help uninitiated students of artificial intelligence in the transition from examples to rules. By creating simple example sets and looking through the generated search trees, students can see how rules are derived.

As a Macintosh program, *SuperExpert* succeeds beautifully. The interface is intuitive and well thought out. The use of *MacinTalk* adds a more convincing flavor to the artificial-intelligence concept. A good Mac interface, however, does not make a good program. I like to have a high degree of control over the rule sets I create, but this program locks me out. I must search my brain to come up with that definitive set of examples that makes the system generate the correct advice. With a production system, I could write a few rules in plain English.

SuperExpert is a good way of learning to visualize rules. The Rule window clearly displays the trees generated from examples, but it becomes unwieldy when many criteria and examples are used. *SuperExpert* will not make my most recommended, expert-system shell list. At a lower price, *SuperExpert* would make a good educational product. At any price it lacks the flexibility and control required for serious knowledge-system development and problem solving.

SuperExpert
★★½
List Price: $199.95.
Published by: Softsync, Inc., 162 Madison Avenue, New York, NY 10016; (212) 685-2080.
Requires: 512KE. Mac II friendly; *MultiFinder* hostile. Version 1.4 reviewed. Not copy protected.

— Daniel W. Rasmus

MUSIC

JAM SESSION



If you've stayed away from computer music programs because you can't play an instrument or read music, then *Jam Session* is for you. It makes the Mac the great equalizer for those without musical talent. No matter what you do, you're still in tune and with the beat.

To start jamming, open any of the dozens of songs that are provided on this three-disk set. A screen appropriate to the music appears: jazz musicians in a club, a pianist in a concert hall, a country group in a barnyard, and rock 'n' roll and rap groups. Background music starts when you use the PLAY command; then you can jump in anytime.

The Macintosh keyboard is your instrument. Generally, the top row of keys plays single notes, the next plays slow riffs (a short series of notes), the third plays fast riffs, and the bottom row plays percussion or adds special sound effects. The whole point of *Jam Session* is that you can't play a wrong note. Although each key plays a different note or riff, anything you play always blends with the current song. In the rap version, each key is a word or a typical rap sound such as a record scratching. It's easy to get carried away, and if you don't tell your friends the secret, they'll think you've been hiding your musical talent all these years.

The graphic backgrounds are terrific. There's minimal but clever animation as the musicians in each scene come alive. The pianist's flailing upper body during the fast riffs is especially amusing. And there are minor humorous touches that you don't even notice at first: In the concert hall, for instance, a few *z*'s float up from a sleeping member of the audience. In the jazz club, keep an eye on the glass that holds the tips.

Jam Session has several nice options. You can always pull out the keyboard layout if you forget where the fast riffs are or how to

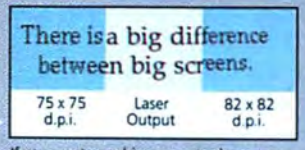
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Quick Clicks



access the special sounds. (Some songs are different from others.) The Option and Command keys, respectively, cause the riffs you play to descend or ascend chromatically. The spacebar halts a riff, and there's always the Applause key when you need some positive feedback. You can even keep a small piano keyboard on-screen and see your notes highlighted as you play.

There's a little more depth to *Jam Session* than is at first apparent. There's a riff editor that lets you use standard musical notation to write your own rhythmic phrases for each song. The editor is a simple affair, but it's adequate for the job. You can record as you jam and play your own part back. There's even a Jam Player that you can use to play your songs for anyone who doesn't have *Jam Session*—you're allowed to give out the Player along with any of the songs you do.

The *Jam Session* package also includes a Synthesizer with 21 built-in instruments, 6 rhythms, a slide tempo control, and special effects such as Drops and Arpeggiator. You can set the controls to any combination and use the keyboard as you would a keyboard (if you know what I mean).

Although *Jam Session* has more depth than you first realize, there's not enough to keep you going for an extended period. *Jam Session* is terrific, but it probably wears thin pretty quickly. Adults will love it at first, but kids will love it longer.

Jam Session

List Price: $49.95.
Published by: Broderbund Software, 17 Paul Drive, San Rafael, CA 94903; (415) 492-3500.
Requires: 512K+. Mac II friendly; *MultiFinder* hostile. Version 1.1 reviewed. Copy protected with key disk.

—Sharon Zardetto Aker

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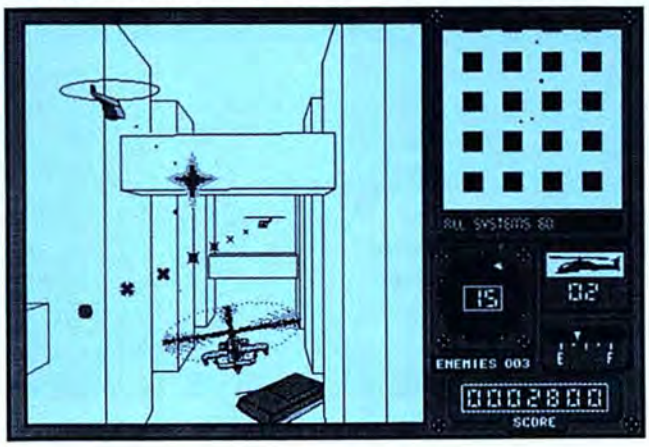
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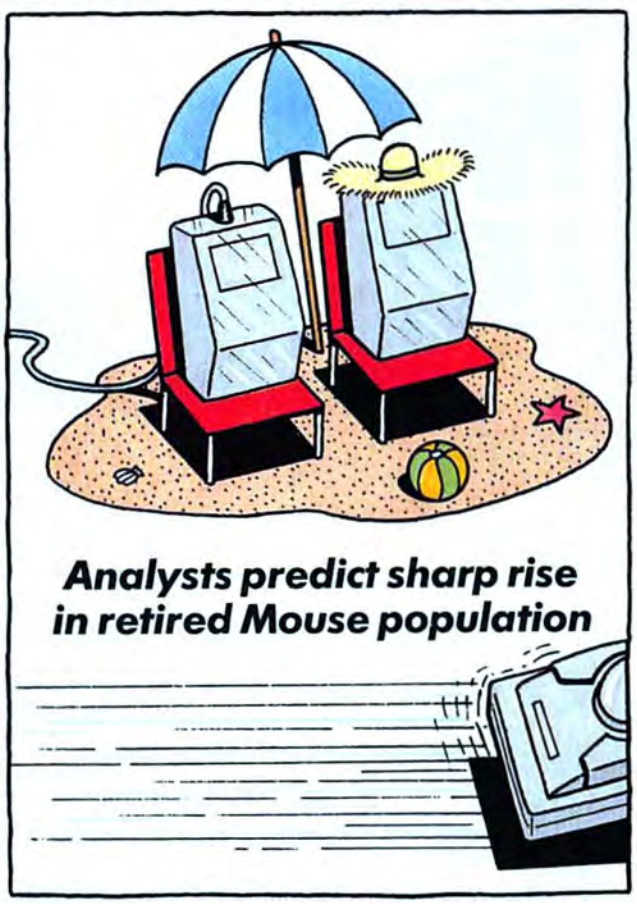


The year is 1997. A Stealth bomber has transported your Apache AH-64 helicopter deep behind the borders of the Soviet Union. Your mission: Destroy that nation's Strategic Defense Computers. To do so, you must dash through canyons of buildings, locate an SDC suspended somewhere in the labyrinth of streets, and annihilate it with one of your missiles.

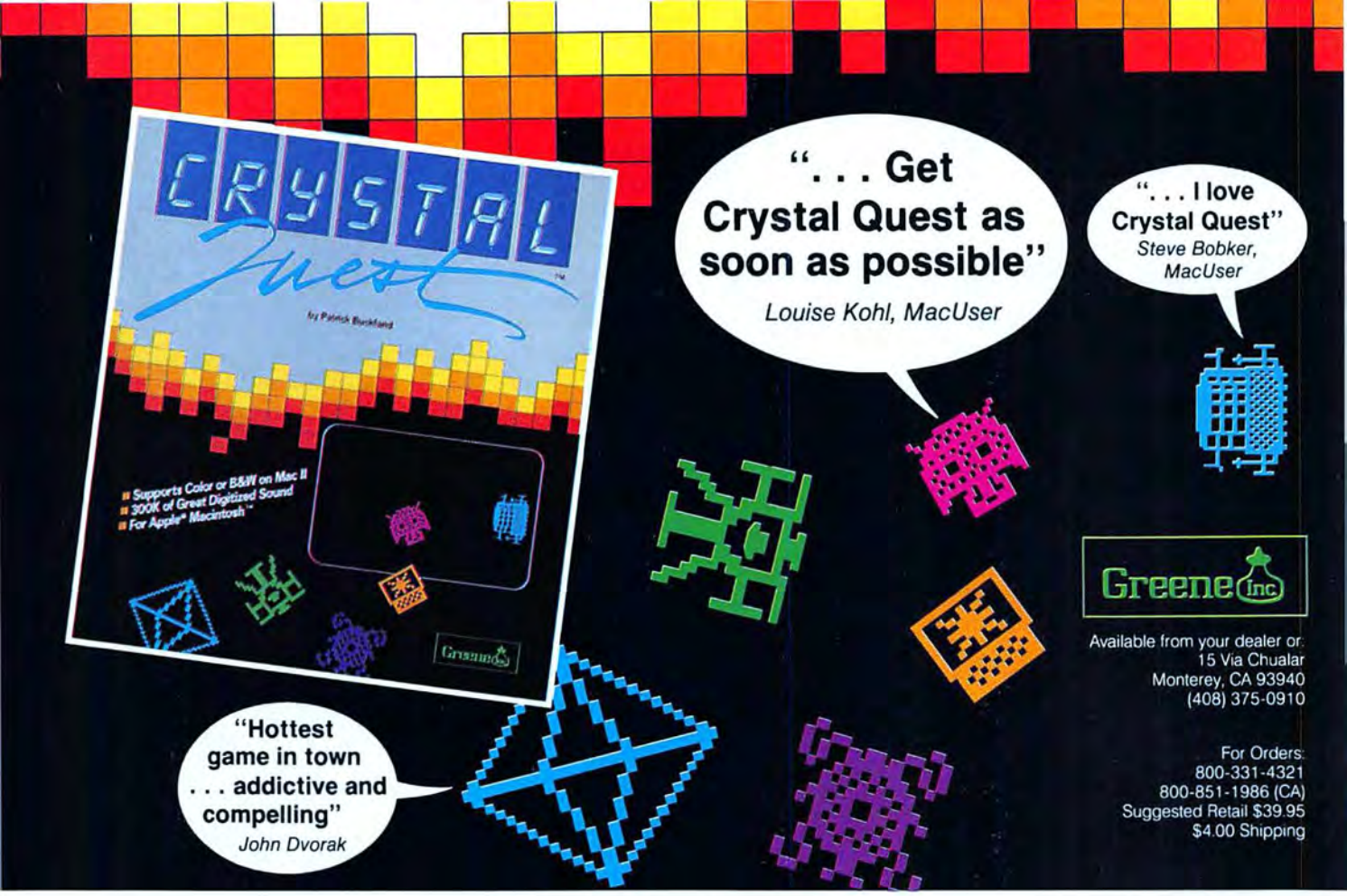
That's the premise behind *Apache Strike*, but in truth this is an arcade game. Its object is to score points. If you fancy action games, *Apache Strike* can be entertaining, even in this age of *glasnost*. It's somewhat like the attack on the Death Star in the original *Star Wars* film. If you remember, rebel pilots crashed into the walls a lot. You will too.

The Strategic Defense Computers, of course, are the most valuable targets. But also important are the defending helicopters and





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tanks. Getting them adds to your total and, because they shoot back, lets you attack an SDC with some comfort. Destroying it advances you to the next city/level.

You begin a game at the the 1st, 20th, or 40th level. As you ascend levels, the degree of difficulty (more defenders, greater distance to target) increases. There is no end. Use up the allotment of three Apaches on any level and the game is over.

At the left of your screen is an animated view of your helicopter as seen from above and behind. On the right is a control panel, including a radar and an indicator showing the distance and direction to the SDC.

Apache Strike works on 512K Macs but needs more memory for some features. On 1-megabyte Macs, the status reports are given verbally by LINDA, the Apache's on-board computer. By the way, the speech generator sounds great.

Apache Strike monopolizes all of the Mac's internal memory. It won't work with *MultiFinder* or any software that takes over a portion of RAM. This includes some hard-disk drivers, so check your system configuration as well.

Apache Strike is playable, but control is vague, especially at the start. A bit of practice helps you get the hang of flying. Still, I never became accustomed to maneuvering with the mouse. A joystick is a definite improvement. I used the Nuvo Labs *Arcade Adapter* to connect one and it worked fine. Don't be misled — there is room on your working disk for the *Adapter*'s INIT file.

Although the animation is smooth and most of the images are solid, the graphics could be better. Buildings are simply represented by lines, making maneuvering needlessly difficult. The effect is like trying to fly through a hall of mirrors, and it's easy to lose track of where you are. Some shading of building surfaces would help.

Other suggested improvements would be different city layouts (all are the same) and a more realistic chopper. This Apache can only fly forward and at one speed. What's the point of a helicopter if you can't hover or turn in place?

Apache Strike lacks the compulsive drive to make it an addictive shoot-'em-up. Silicon Beach once scored big with an arcade game called *Airborne*. It would have done better to revive that old standby than to offer this bare-bones game.

Apache Strike

List Price: $49.95.
Published by: Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126; (619) 695-6956.
Requires: 512K+. Version 1.0 reviewed. Mac II and *MultiFinder* hostile. Not copy protected.

-Carlos Domingo Martinez

ENTERTAINMENT

THE FOOL'S ERRAND

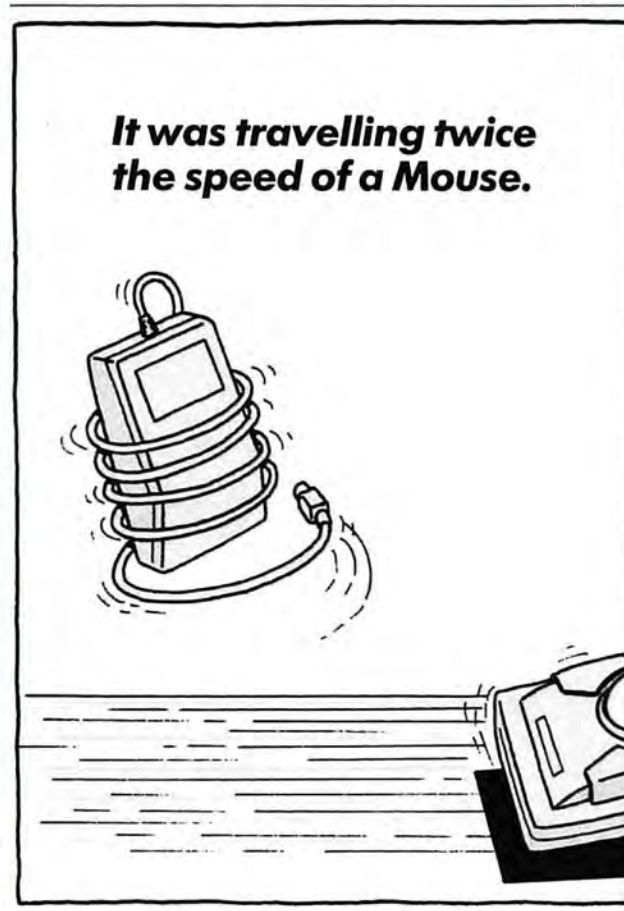
The Fool's Errand from Miles Computing is a *tour de force* of gaming excellence, a scintillating potpourri of puzzles to ponder, mazes to mouse upon, and challenges to compute. Author Cliff Johnson has taken computer gaming, turned it inside out and upside down, and redefined the state of the art to a new high in achievement that could only have been accomplished on the Macintosh.

In one sense, *The Fool's Errand* is a collection of 80 puzzles to solve. In another sense, it's the world's first interactive myth with a hero of the legendary status of Gilgamesh, even the equivalent of Beowulf in computer gaming.

The game begins with a wonderful *VideoWorks*-type "movie" that introduces you to The Fool and his errand to unseat the evil High Priestess from worldwide dominion. His first ally is no less than The Sun, who presents him with a map of tiles, most of which are missing and out of place. To reassemble the map, which must be used to unravel the final mystery of the evil Priestess, The Fool must seek help in many lands, from many peoples, all by accepting the challenges, the puzzles they place before him.

Some of the puzzles are jigsaws in which a scrambled picture is presented to the player. You need a keen eye to see the relationships among the various parts. The solution presents both another tile for The Sun's map and a visual clue. The graphics on these puzzles are reminiscent of the better decks of Tarot cards — dark and brooding, silhouetted yet detailed.

Other puzzles present



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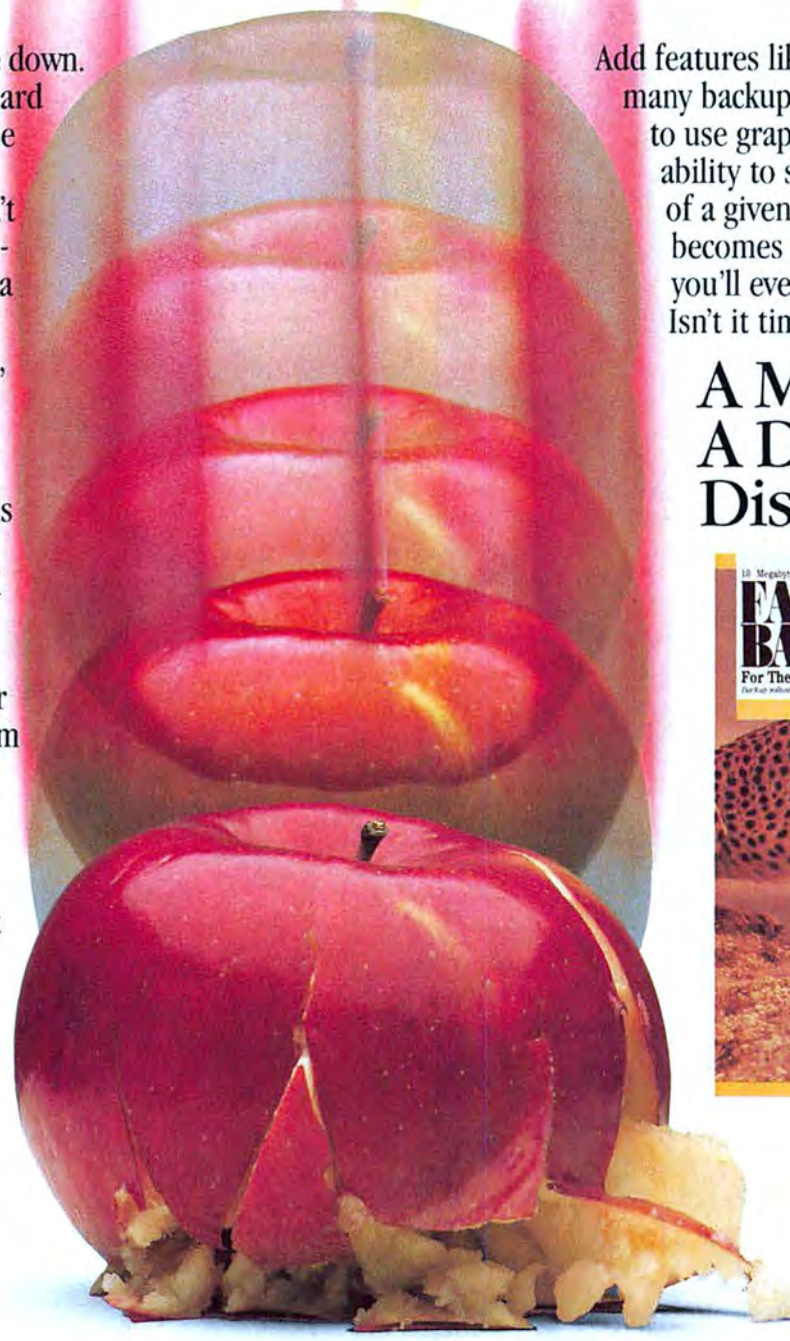
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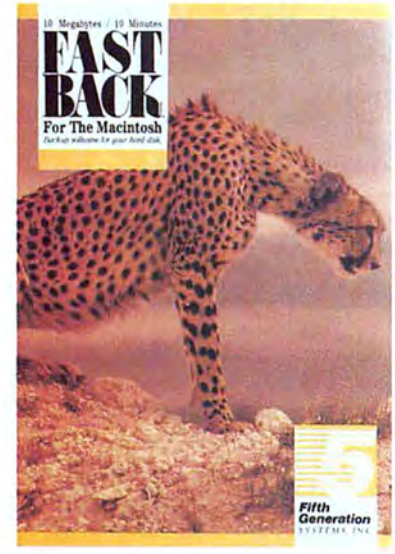
Because now the all-time, best selling backup utility, FASTBACK, is available for the Mac.

Backing up a whole disk is up to five times faster than other backup programs. And daily, incremental backups should average about a minute. *Mac Week* called it "far and away the fastest program available for the Mac." And went on to say that its "extraordinary speed will encourage frequent backups, perhaps the most important consideration with backup software."



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A Minute A Day Keeps Disaster Away

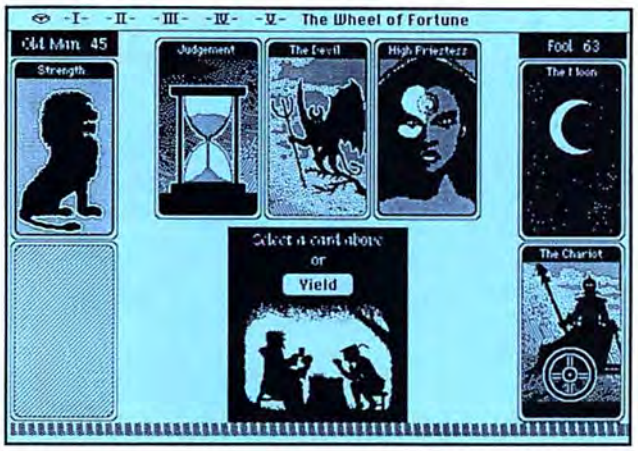


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Quick Clicks



various renditions of mazes that you must solve by moving through them with the mouse. Some of the mazes redefine themselves as you play, with walls that move and trap you in one-way corridors. Other mazes may depend upon anything and everything from partial invisibility to mind-busting intricacy to stymie the player. But all can be solved by perseverance.

Then there are puzzles the likes of which never existed before.

There are puzzles with buttons at the bottom of the screen. Press one and a shadow appears. Press the next and the shadow is crossed by light. Press a third and yet another shadow appears. Keep pressing and suddenly the random penumbra forms the shapes of letters that are all intertwined and influenced by the order in which the buttons are moused. Can you find the final letters, the clue, and obtain the prized Sun Map tile? These are challenging indeed.

Dexterity, too, is needed for some of the puzzles. Yet even the most dexterous puzzle depends on a well-ordered mind to direct the hand that wields the flashing mouse. In one puzzle, for example, you not only have to press randomly flashing, eye-deceiving buttons but also do so in an order that their very flashing has defined for you. There is no real way that words can describe an experience that must be seen to be understood — or not understood, as the case may be. Suffice it to say that reflexes must always be coupled to synapses and that the player who accepts The Errand will never lack for mental and physical stimulation.

Finally, after you have solved all 80 puzzles, you must solve the secret of The Sun's Map. Those who manage this will find a true treat in the form of another "movie" that only successful Fools can view.

So, as a game, *The Fool's Errand* has enough challenge, enough puzzling perplexity, enough mousability, to rate it, even with nothing else added, as a true "five mouse" program.

But *The Fool's Errand* goes beyond being "just" an excellent game. It ventures into the realm of myth, into the prototypical lands of the epic legend, into the maelstrom of the Jungian archetype, and it returns to our world and offers us a way to extend ourselves beyond the boundaries of our normal existence.

Now, with *The Fool's Errand*, you too have the possibility before you of accepting the type of challenge other heros, previously dressed in panther skins and on first-name terms with various gods, have taken up before you.

The Fool's Errand

List Price: $49.95.
Published by: Miles Computing, 7741 Alabama Avenue, Suite 2, Canoga Park, CA 91304; (818) 341-1411.
Requires: 512K. Mac II friendly; *MultiFinder* hostile. Version 1.1 reviewed. Not copy protected.

— *Neil L. Shapiro*

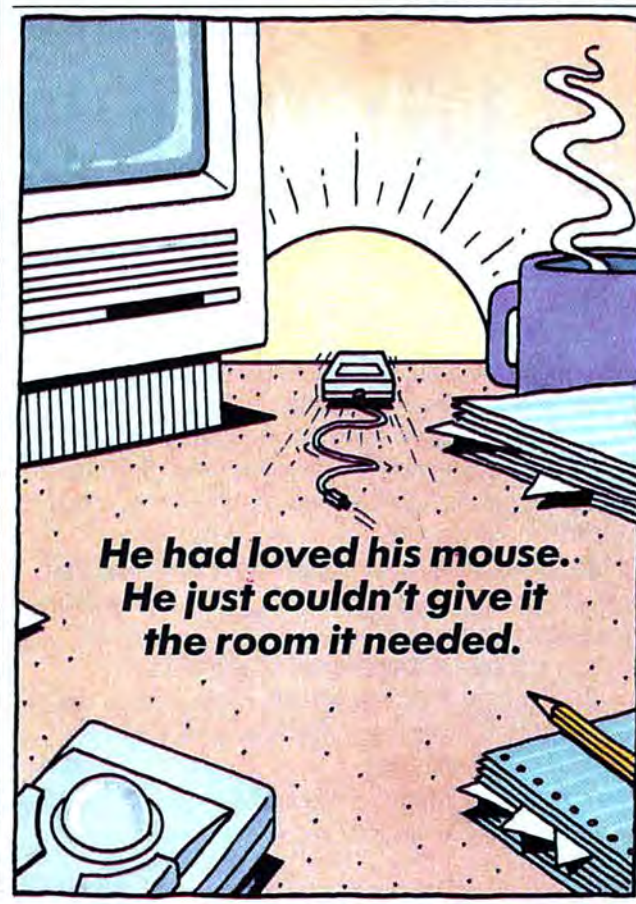
HARDWARE

QMS-PS 810

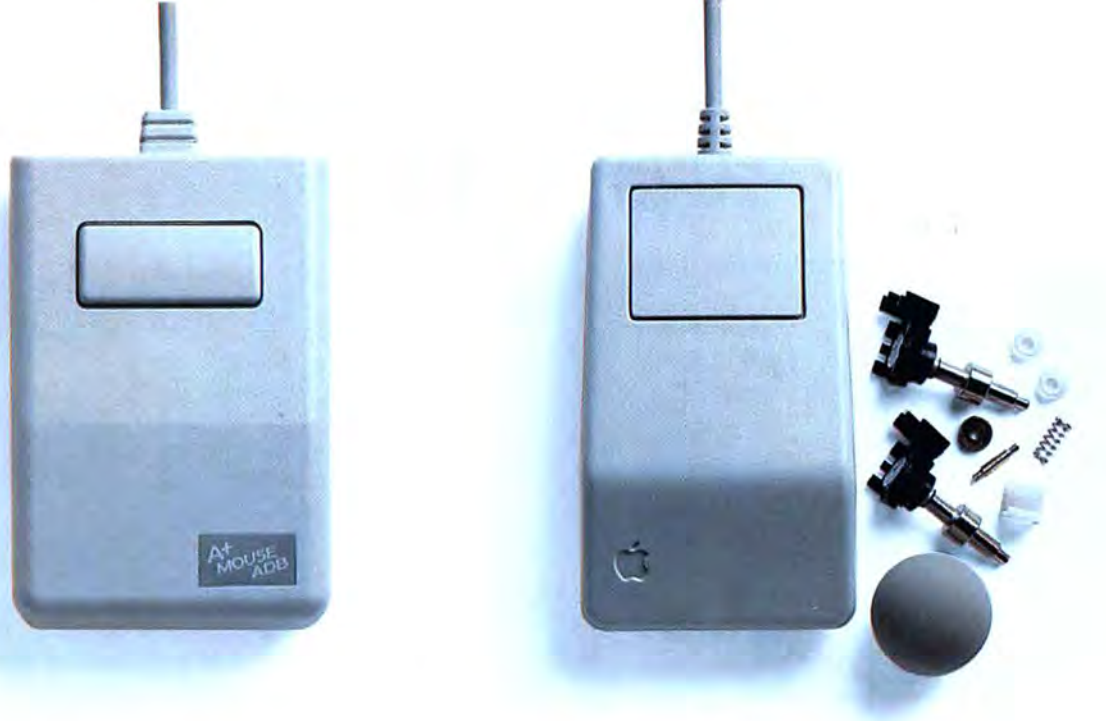


QMS, the company that likes to turn LaserJets into PostScript printers, has released the QMS-PS 810 as its latest entry into the 300-dpi, PostScript-printer market. If you, in turn, want to use a PostScript printer to produce LaserJet output, QMS offers a good solution; otherwise, Apple probably offers a better deal.

The PS 810 is in many ways similar to Apple's new LaserWriter II NT and thus begs comparison. It uses the same Canon SX engine as the NT, which means that the two machines' output looks pretty much the same.



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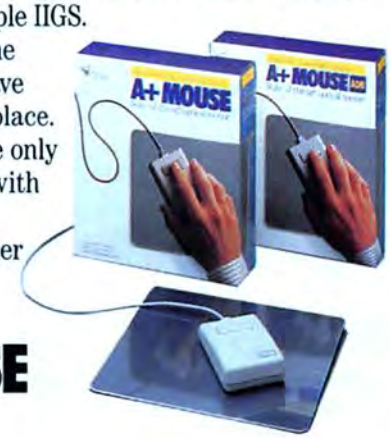
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Quick Clicks



The SX, as many readers probably know by now, is revered for its blacker blacks. Type produced by the SX looks more solid than it did on older machines. The Canon CX engine, used by both Apple and QMS' first-generation PostScript printers, was notorious for its gray "blacks" and thin-looking type. Because type is what people print most often, and because most people prefer the SX's darker type, the general opinion seems to be in favor of the SX. (I'm among a small minority of dissenters.) But in improving on the blackness of blacks, Canon shortchanged the grayness of grays. If you do a lot of large gray-filled areas, including large gray type, you will notice more streaking than was present in the CX's output and a less even gradation across a range of gray shades. Both the NT and the PS 810 have these blacker blacks and degraded grays.

The PS 810 also uses the same 68000 processor as the NT does, along with the same Version 47 of PostScript. QMS, however, runs the PS 810's processor at 16 MHz, whereas Apple runs it at 12.5 MHz. You would think that the PS 810 runs faster than the LaserWriter II NT, but I'm unable to report conclusive results on this point. QMS claims that in its own internal tests, the PS 810 outperformed the LaserWriter Plus by 20 to 30%. An independent testing company confirmed QMS' results.

My tests — admittedly limited — on documents containing standard text and bit-mapped images showed that the PS 810 was generally about 5 to 10% slower than Apple's competing printer. And when printing documents that required intensive font caching (many different fonts, type styles, and sizes), the PS 810 was nearly twice as slow, taking 4:38 to print a document that cached 936 characters as compared to the NT's 2:23 seconds. Because my earlier tests had shown the NT to be generally faster than the Plus, I'd have to say that not enough returns are in on this race to call a winner yet. So what's a user to do? Take an assortment of your favorite documents down to your local computer store and test them yourself. After all, it's your documents you want good throughput on, not the ones I test with.

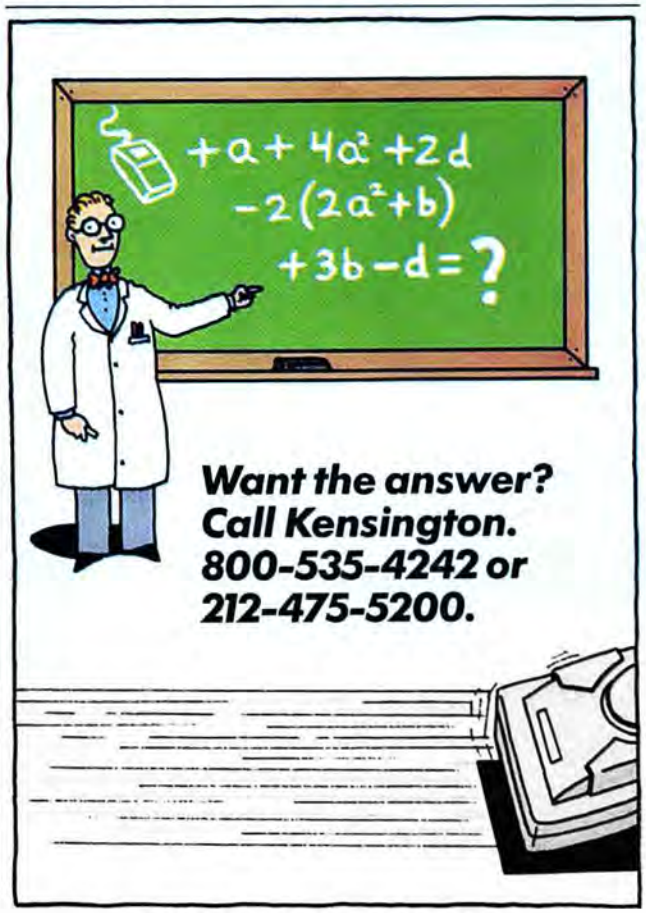
One undisputed advantage of the PS 810 is that in addition to providing PostScript and Diablo 630 emulation, it also provides HP LaserJet and HPGL emulation. HPGL is a plotter-control language. For offices in which PCs and Macs coexist and in which users need a printer that can serve a variety of applications, some of which may not support PostScript, the PS 810 offers possibilities that Apple's LaserWriters can't match. The PS 810 also provides a Centronics parallel port in addition to the standard RS-232-C and AppleTalk connections.

Another feature that the PS 810 offers and the NT does not is the ability to upgrade it from 2 megabytes to 3 megabytes (at a cost of $400). With 2 megabytes, you can download about 13 fonts to the PS 810 before you overload memory. The extra megabyte of memory increases download capacity significantly (I was unable to test this option, so I can't say by how much). If you want 3 megabytes in a LaserWriter II, you need to buy the high-end NTX.

Which brings me to the bottom line: The PS 810 costs $900 more than the NT; however, the 2-megabyte NTX costs $700 more than the PS 810. You'll simply have to weigh all the factors — speed, price, upgradability, emulation capability — and make the choice yourself, based on your specific needs.

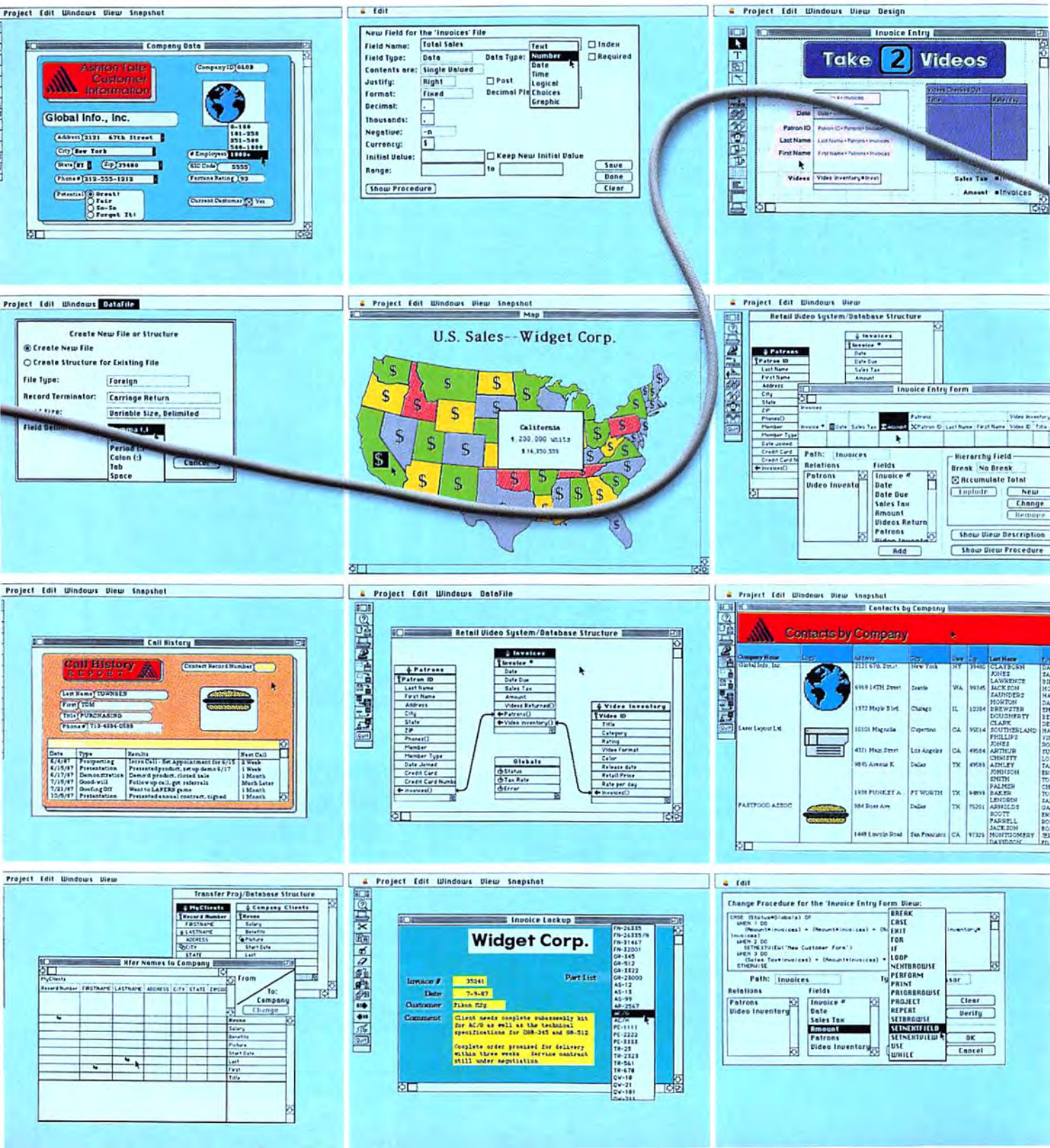
QMS-PS 810
★★★½
List Price: $5495 (2 megabytes); $5895 (3 megabytes).
Distributed by: Laser Connection (a QMS company), 7852 Schillinger Park West, Mobile, AL 36608; (800) 523-2696.
Requires: 1 megabyte.

—Henry Bortman



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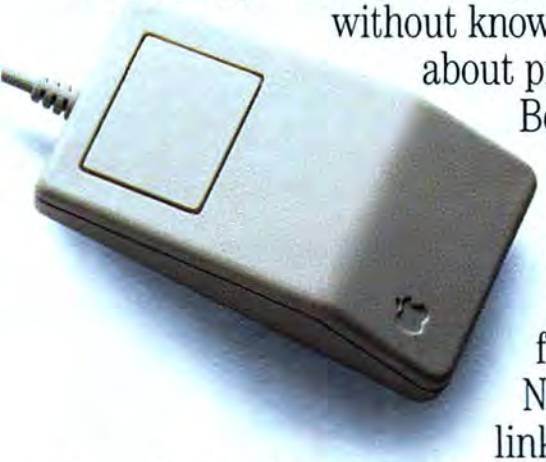


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*Hardware requirements: Macintosh Plus, Macintosh SE, Macintosh II with at least 1MB memory. †While supplies last. ††In Colorado, call (303) 799-4900, Extension 2403. Trademarks/owner: dBASE, dBASE II, dBASE III, dBASE III PLUS, Ashton-Tate/Ashton-Tate Corp.; MacDraw/Macintosh/Apple Computer Inc. ©1988 Ashton-Tate Corp. All rights reserved.

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FROM THE DUBL-CLiCK COLLECTION



MacUser gave WetPaint 5 mice (Sept. 1987) saying "...the WetPaint art is almost a must for clip art users; the ArtRoundup desk accessory is a neccessity." Volumes marked with ✳ were previously released as "MacMemories."

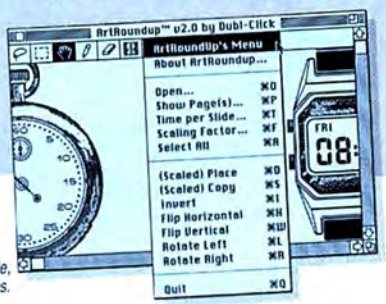
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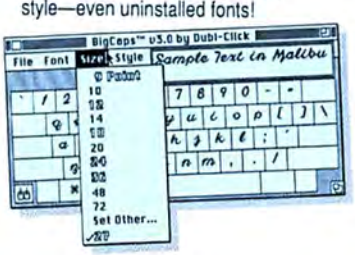
ArtRoundup comes free with WetPaint, and can Scale, Invert, Flip and Rotate the largest of paint-style images.

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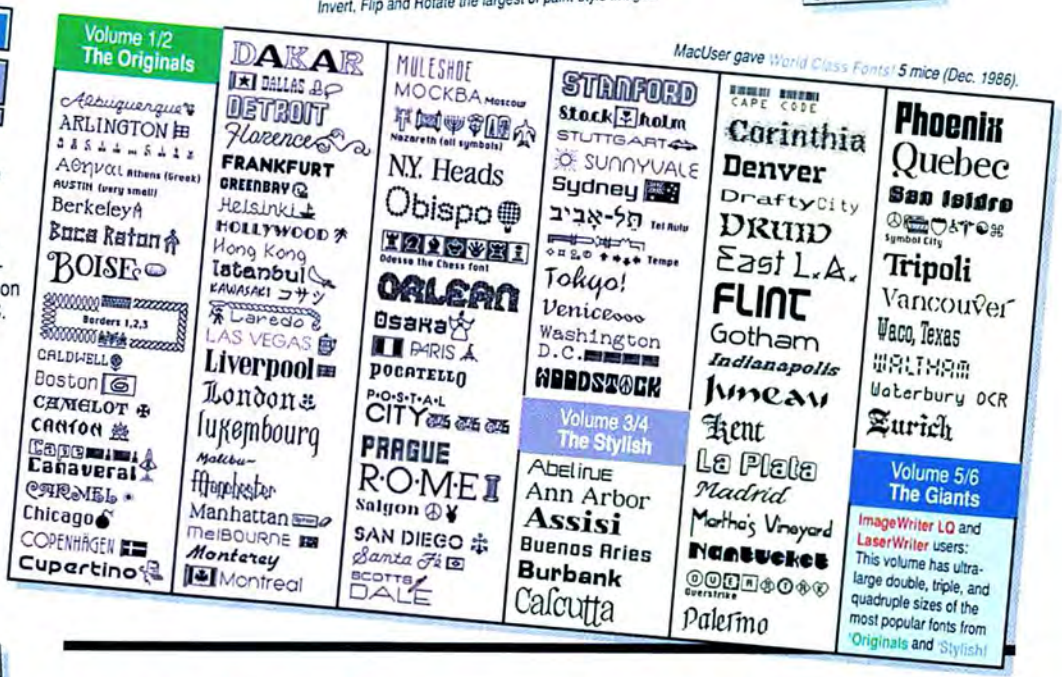
Each volume is chocked full of what MacUser magazine describes as "the Best collection of ImageWriter fonts available." **We just made the Best even Better!** All World Class Fonts volumes have now been redesigned to achieve even better results on the ImageWriter LQ and LaserWriter SC.

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MacUser gave World Class Fonts! 5 mice (Dec. 1986).



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TIP SHEET

COMPILED BY CHIP CARMAN

Found a trick, short cut, or smarter way to get something done with a program? Share your hints by sending them to The Tip Sheet, c/o *MacUser* Suite 250, 110 Marsh Drive, Foster City, CA 94404. We pay at least $25 for every hint we publish, plus we'll print your name and hometown.

Every month we'll select one tip as the Tip of the Month. The person who sends in that tip will receive $100 for it.

MACWRITE 4.6

There are many new things in *MacWrite* 4.6. The most noticeable is the use of the Cursor Keys. To go to a point in a text passage, just use the Arrow keys. To go to the beginning of a line, press Command-Right Arrow key or Command-Left Arrow key. To go to the bottom or top of a page, press Command-Up or Command-Down Arrow key. To go left or right a word at a time, press Option-Right or Option-Left Arrow key. Finally, to go up or down a paragraph at a time, press Option-Up or -Down Arrow key. You can select a paragraph, letter, work, or page by combining these key combinations with the Shift key.

BRYN WILLIAMS
STATE COLLEGE, PA

MACSBUG

Version 5.5 of *MacsBug* is a stand-alone application as well as a debugger. Running it as an application displays a Mandelbrot graph in successively higher resolutions. It adjusts to your screen size and will display in color on Mac IIs. Also, *MacsBug* has a couple of handy FKEYs. One rotates through the open windows, bringing each to the front one at a time. The other FKEY breaks into the debugger as if you had pressed the interrupt button on the programmer's switch.

STEPHEN DOHERTY
HAWTHORNE, CA

DARK CASTLE

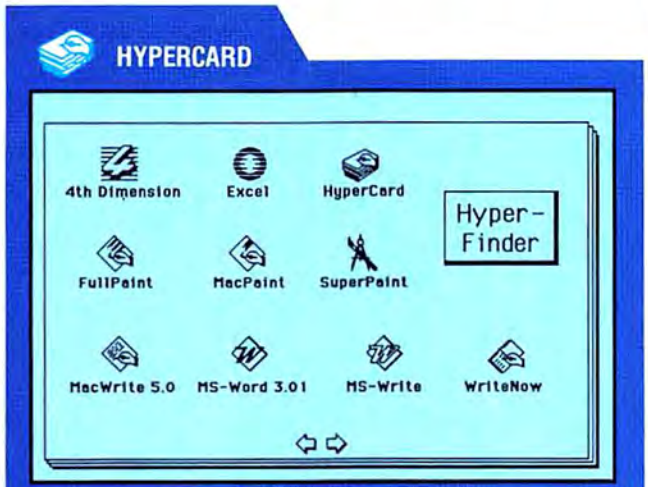
In *Dark Castle,* the easiest way to knock out the whip henchman is to duck at the moment you take the morningstar. You will be halfway under the floor level and the wind cannot hit you. You will be returned to the floor when the sadistic torturer falls.

BRYN WILLIAMS
STATE COLLEGE, PA

HYPERCARD

Making a HyperFinder stack turns out to be very easy. A HyperFinder is a Finder/MiniFinder alternative that allows the user to remain in *HyperCard* while accessing other applications. Instead of using *ResEdit* to copy, alter, or paste application icons into a stack, I found a simpler method. Simply select all your applications (on a hard disk) and install them in the *MiniFinder.* Next, screen dump the *MiniFinder* screen with Command-Shift-3. Back in *HyperCard,* load the *MacPaint* document created by the screen dump with *Art Grabber* and paste the icons into your stack. You can make modifications, rearranging and adding text, but you could just leave it exactly like the *MiniFinder* screen. Then add buttons behind each icon to access the corresponding application. I added an intermediate card for each application. Clicking on an icon brings up a card explaining the application, along with tips and techniques. This intermediate card has two buttons, one for the application and one to return to the HyperFinder.

STEVE YOUNG
FRESNO, CA



When creating a *HyperCard Finder* substitute, you don't have to resort to *ResEdit* for your application icons. Using a pre-6.0 version of the *Finder,* load your applications into the *MiniFinder,* make a screen dump of the *MiniFinder* screen, and paste the icons into *HyperCard.* You can then rearrange them, clean up the text, and design the layout however you wish.

The FIND command of *HyperCard* searches only for the first occurrence of a string in a stack. The FIND menu item continues its search for the next occurrence of the string in the stack after the Return key is depressed.

If you want to prompt the user of your stack with a personal message (not the standard FIND of the Message box), and want to continue the search after the first match, use the "Ask" dialog box to enter the string to find. Then "type" it in the message box with the TYPE command.

All this can be done with the message box hidden if the BlindTyping is set to true. Here is an example of a script of a "Find" button:

```
on mouseUp
  go first card
  ask "Find what word or¬
 group of words?"
  type "find"  & quote & it &¬
quote & return
 end mouseUp
```

If you type "Macintosh"



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3. Dial 1-800-638-8369. When connected, enter HHH
4. At the U#= prompt enter **XJM11790,GEnie** then RETURN.

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as the string to find, *HyperCard* will itself type the string "Find Macintosh" in the visible or invisible message box, and will itself depress the Return key to begin the search.

The next time you depress the Return key, the search will continue, as with the FIND menu item. With the command FIND IT (it = "Macintosh"), only the first occurrence of the string "Macintosh" would have been found, and the Return key as a "continue the search" command would not have worked.

(The reason why I don't use doMenu "Find..." is that the word *find* in the message box is in English, and my stacks are in French. I know how to translate the menu bar in French with *ResEdit*, but I did not find a way to translate the word *find* in the message box. Using an Ask dialog box allows me to prompt the user with the string of my choice.)

MARK LEPAGE
MONTREAL, QUEBEC

When printing *HyperCard* cards and stacks using my LaserWriter Plus, more often than not, field text prints as a bit-mapped font rather than the desired PostScript font. Sometimes, both types of printouts will appear on the same card, even though the fields called for the same LaserWriter fonts.

This anomaly appears to be caused by superimposing a button or another field onto a field of text. In order to print in a PostScript font, each field must be clear of obstructions. Unfortunately, this quirk makes it difficult to include icons in a text field when preparing cards with the intention of printing them on a LaserWriter.

WILLIAM H. BLUE
SEATTLE, WA

[*We've found that this Font Substitution error only occurs when the button is positioned over text — not just on a text field.— Ed.*]

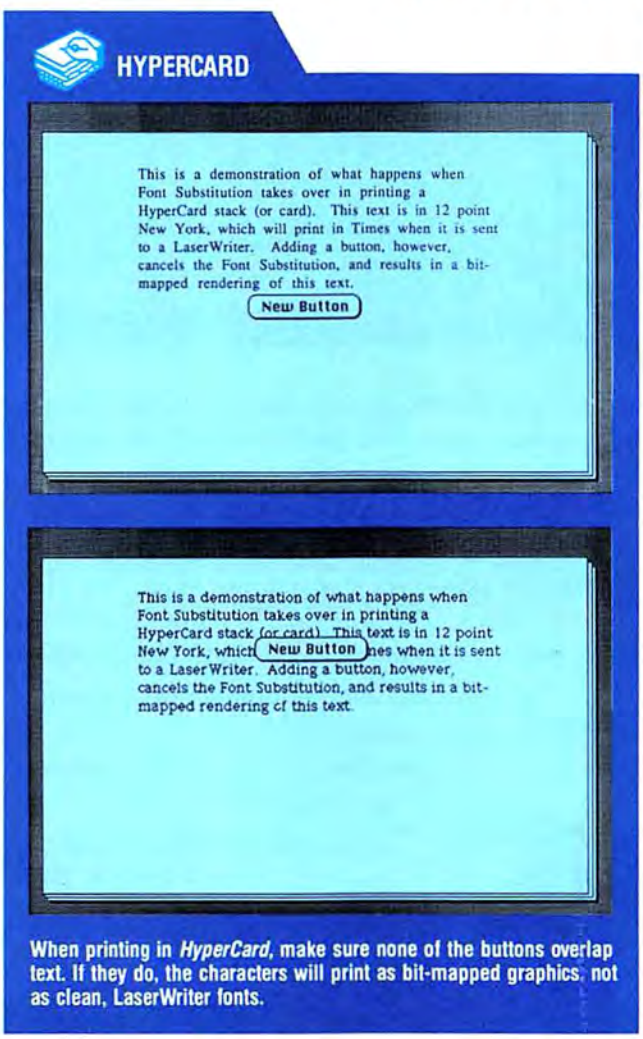
When dialing numbers from the Address stack that comes with *HyperCard*, there is no obvious way to hang up once a number is being dialed or has been dialed. I have solved this problem by adding a background button to the address stack that sends a hang-up message to the modem. The script which I used is:

```
on mouseUp
  send "dial " & quote & quote
& "with modem " & ¬
    quote & "+++ ATHO" & quote to
HyperCard
end mouseUp
```

This sends a hang-up message to the modem. If you have the phone off the hook, you will still be connected until you manually hang up.

I named my button 'Hang it all!' and placed it just below the phone button.

JEFF LINDSAY
APPLETON, WI



When printing in *HyperCard*, make sure none of the buttons overlap text. If they do, the characters will print as bit-mapped graphics, not as clean, LaserWriter fonts.

In *HyperCard*, using the dialing feature with a Prometheus modem can be a little difficult if the modem doesn't switch from data to voice transmission. Prometheus thinks this is a bug in *HyperCard*, but, not so.

In the Phone Stack that is supplied with *HyperCard*, open the Stack script. Find the code that reads:

```
then send "dial" & quote &¬
dialNumber & quote ..
```

Change them to read:

```
then send "dial" & quote &¬
dialNumber &";H" & quote ...
```

Now the modem will switch to voice transmission immediately after dialing a number.

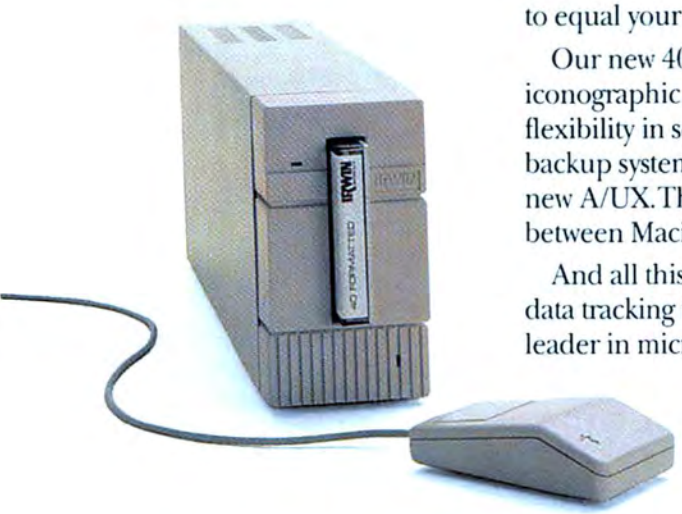
DEN REICHARD
ROANOKE, IN

FKEYS

If you are looking around in a file with *ResEdit* and you see an FKEY resource, or you just want to try an FKEY before putting it in your System file, you can try the FKEY while in *ResEdit*. The system looks through the chain of open files, not just the System file, to find FKEYs. Since *ResEdit* has opened the file, when you press Command-Shift-N, where N is the ID of the FKEY, the FKEY is invoked. The most recently opened file is searched first, so even if the FKEY you want to try has the same ID

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as an FKEY in your System file, the FKEY you want to try is invoked instead of the one in the System file.
STEPHEN DOHERTY
HAWTHORNE, CA

MULTIFINDER

While running the *Finder,* you can start the *MultiFinder* without restarting your Macintosh by double-clicking the *MultiFinder* icon (in your System Folder) while holding down the Option and Command keys. The next time you do Restart, you will be back in the *Finder.*
STEPHEN DOHERTY
HAWTHORNE, CA

EXCEL

Here is a tip born from necessity. I needed to have a 5 digit number in a field at all times. But in *Excel,* if the number you begin with starts with a "0", it doesn't recognize it and goes to the first non "0" number. With my tip you do not need to put in all 5 digits: *Excel* will add the leading zeros for you.

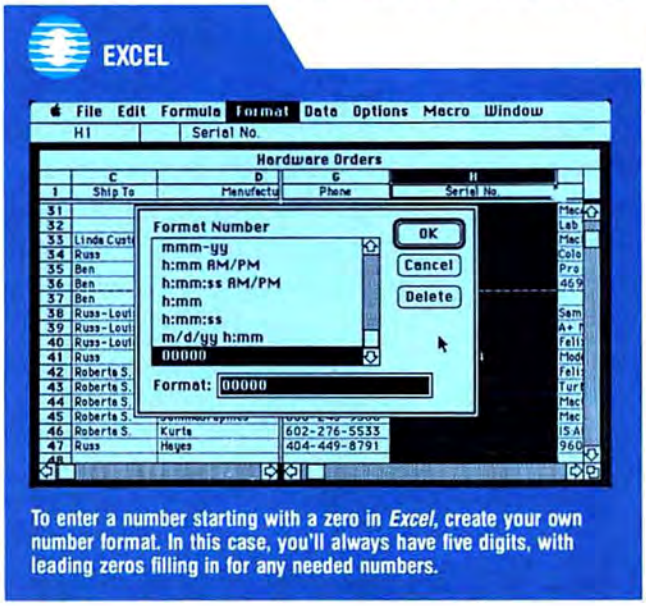
Select a column or cells, open the Format menu and add "00000," or the length you need.
ROBERT STEPHENS
CHINO, CA

MACCALC

Chances are that not all of the fonts in your System will show up in the font menu of *MacCalc.* This is because *MacCalc* only recognizes those fonts with resource ID numbers less than 32. These numbers can be manually reset with *ResEdit* to be less than 32. Unfortunately, no more than 32 fonts will then be available, but at least you can choose which 32 you want.
JEFF LINDSAY
APPLETON, WI

ZBASIC

Every program compiled with *ZBasic* displays a default window at startup. I've found a patch to fix that. Using *ResEdit,* open your compiled program. Find the CODE resource and open it. Look for the CODE ID=4, and double-click on it. Using the scroll bar, scroll until the end is reached. Then, search for the hex string "0026 0004 0140 01FE" and replace it with all zeros. Save the change to your application and that's it.
CRISTIAN PAGE
QUEBEC, CANADA



To enter a number starting with a zero in *Excel,* create your own number format. In this case, you'll always have five digits, with leading zeros filling in for any needed numbers.

NOTEBOOK

Don't search through years' worth of *MacUser* looking for that nifty tip you remember reading about. When you see a tip you think might be handy to you, copy it down in the System Notebook of the application it applies to; that way it'll be where you can get at it when you need it.
GERARD F. SIROIS
US ARMY, WEST GERMANY

LASERWRITER

If you're using a LaserWriter to print, don't forget the two "ligatures" that all the LaserWriter fonts provide: "fi"and "fl." These will make your text "extra tight" for best appearance. The "fi" is Option-Shift-5 and "fl" is Option-Shift-6. Don't forget the printer's quotes either:

```
" Option-[
" Option-Shift-[
' Option-]
' Option-Shift-]
```

There are several desk accessories and INITs available through on-line services and user groups that make using printer's quotes easier. The ligatures are probably easiest if you type in "fi" and "fi" normally and use a search-and-replace in your word processor before printing.
MIKE MORROW
ANN ARBOR, MI

REFLEX PLUS

In the article "Trusting Your Reflexes" by Linda Custer in the February '88 issue of *MacUser,* Linda makes the complaint that *Reflex Plus* lacks a "goodie" for sliding fields. The effect of a sliding field can be created easily in *Reflex Plus* (and *Reflex for the Mac*) through concatenation. The examples stated by Linda concerning sliding the state and Zip code to the left if a city name is short can be achieved by creating a single field in the report. This field is then described in the formula panel as:

```
CITY&", "&STATE&"  "&ZIP
```

Reflex concatenates the three data fields into the new field, essentially "sliding" the values.
TERRY C. GALE
ELBERT, CO

LASER PREP

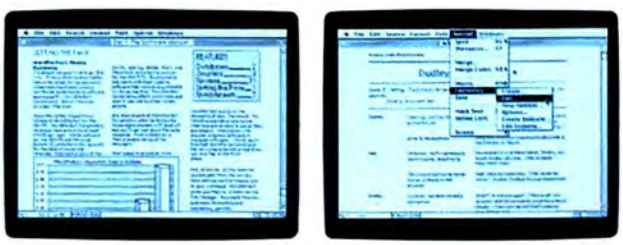
Got a mix of Mac 512Ks, Pluses, SEs, and maybe even a Mac II (you lucky dog) on your AppleTalk network? Are all the 512K users cursing because they have to manually reset the LaserWriter every time they want to use it? If so, have I got a deal for you.

The problem is that the LaserWriter driver and Laser Prep programs versions 4.0 and later (supplied with all Macs after the 512KE) initialize the printer differently than the version 3.0

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WordPerfect for the Macintosh

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programs supplied with the 512KE. The version 4.0 programs offer the user the options to reinitialize the printer (from their computer) if needed, while the version 3.0 programs simply return an error message and abort the print job. A possible solution is to upgrade the 512Ks to *System* 4.0, but Apple does not recommend this. Anyway, *System* version 4.0 needs more memory than a 512K can afford to give to the *System*.

The real solution is to trash your old version 3.0 LaserWriter and Laser Prep programs and copy the version 4.0 LaserWriter and Laser Prep programs onto your *System* version 3.2 disk. You should do this only on a copy of your *System*. The new driver and prep programs work fine with the older *System* and they fix the "Can't Initialize Printer" syndrome for good.

The version 4.0 LaserWriter and Laser Prep files can be identified by the creation date of April 14, 1987, which is available in the Get Info window.

JOHN S. ROLAND
MANASSAS, VA

FINDER



In a recent issue, there was a tip showing users how to avoid restarting their Macs if a serious system error occurred. The tip involved pressing the interrupt switch (also known as the programmer's switch) when your Mac bombs and typing "G 40F6D8." This works fine on a MacPlus, but not on a Mac SE or a Mac II. To accomplish this on a Mac SE, use the procedure above, replacing "G40F6D8" with "G409B24". If you are using a Mac II, substitute "G 4080D5CE" for "G 40F6D8." This method has been used many times to copy files from a RAM disk after a system error occurred. If you use this method however, you should keep in mind that a serious system error really does mean serious. Your safest bet after copying the files is to restart your computer.

DAN GREEN
MANASSAS, VA

KLONDIKE 3.3



If you want to take a few moments to ponder your situation, but you don't want to lose 2 points every 15 seconds for taking the time, just pull down the Help menu and pick Rules (or one of the other options). When the window appears, drag it nearly off the screen so you can still see all your cards. As long as the Rules window is active (and the Game window is not), you won't lose points.

BILL DUGAN
HUNTINGTON BEACH, CA

TIP OF THE MONTH

LASER PREP



If you've purchased a laser printer other than an Apple LaserWriter, you've probably found that "Smoothing" does not work.

The Laser Prep file checks to see whether the printer is a LaserWriter. If not, the bit-smoothing algorithm is not loaded into your printer. If you have a file editor utility, such as *FEDIT*, it is possible to enable bit-smoothing for any laser printer.

First, copy Laser Prep from your system folder to a blank floppy disk. Use *FEDIT* to open the floppy volume. Use "Display Sector in ASCII" under the Display menu. Turn "ASCII Modify" on in the Edit menu. Perform an ASCII search to find the string:

```
"Ø}ifelse  exch"
```

Change the "Ø" to a "2." Do a "Write Sector" from the Edit menu. Quit *FEDIT* and return to the *Finder*.

Make sure you save a copy of the original Laser Prep before you perform the next step.

Copy the modified Laser Prep to your System Folder. If you printed a document before modifying the Laser Prep file, cycle power on the printer, and when you print your next document, smoothing will work.

NEIL P. FORKER
STAFFORD, TEXAS

OBJECT ORIENTED GRAPHICS



In *SuperPaint*, *MacDraw*, or probably *Canvas*, *MacDraft*, or other drawing applications, if you are working with a very small object, and it gets difficult to move it — you end up grabbing the handles and resizing the object instead of moving it, and your frustration index goes up exponentially. Solution? Make another larger object near the one you're working with — a filled rectangle works great. Click on your small object to select it, shift-click on the rectangle (to select it also), then drag the rectangle with the cursor, while watching your small object — it will move along with the rectangle. This has an additional benefit in that the cursor doesn't hide your object, thus allowing you maximum precision in placing it. In *SuperPaint* or *MacDraw*, hold down the Option key while dragging so that you can see your object's outline.

MIKE MORROW
ANN ARBOR, MI

READY, SET, GO!



Ready, Set, Go! 4.0 has an obscure feature that can be very handy for improving the appearance of output intended for publication. When text is imported, holding down the Option key to cause all inch and foot symbols to be converted to the appropriate quotation or apostrophe symbols. Two hyphens in a row are converted to the em dash. Two spaces after a period become one space. The modified text can be exported as an ASCII file and it will retain these modifications in a word processing program such as *MacWrite*.

MEYER KATZPER
ROCKVILLE, MD

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manded" and "Shift-Returned" each and every set of data can be unnerving. (Remember a Return is only entered at the end of each record, while a Shift-Return may be used for arranging the data more logically.) To eliminate most of the problem, you can use the DOCUMENT RENUMBER command to number each set of data which isolates the entries with just a Return instead of the desired Shift-Return. Where you find the erroneous Return, put the cursor in front of the entry and press the Delete key, then press Shift-Return. Using the DOCUMENT RENUMBER command also lets you know just exactly how many names and addresses you will be mailing to.

PEGGY YONTS
LOS GATOS, CA



This is an extension to the tip on Microsoft *Word* submitted by Maria Demarco in the March '88 issue of *MacUser*.

Marie's problem involved spacing between letters, while mine concerns spacing between numbers. My documents often involve columns of numbers. These columns are prepared using the right or decimal tab. One expects that the numbers will align on the printer as they do on the Mac screen. However, when these numbers are entered using a proportional font, the alignment on printed documents prepared on the LaserWriter will frequently, but not always, be as much as ¾ of a character off. I found that using the Condensed spacing option at .25 (the minimum according to the manual) on the Character submenu caused the numbers to align without apparently affecting the intercharacter or within-character spacing of associated text.

I called the Microsoft help line to inquire why the compression option fixed the problem. Their response was interesting. I was told that *Word* was a complicated program and that they did not know why some of its features produced the results that they did. It was not the response I hoped for, but it does appear to be an honest one.

The condensed options using .25 points does not appear to affect spacing other than for the numbers that were misaligned. When the .25 point condensed option was selected, I got the following screen message after the processing phase of preparing data for the LaserWriter: "A screen (bitmap) version of the font, 'Geneva,' is being prepared for the printer since no printer font is available." However, I cannot detect any difference in the characters that printed when this message appeared and when it did not.

I successfully used this technique with a Mac SE and Mac II driving a LaserWriter with version 4.0 of the LaserWriter driver, and a Mac Plus with version 5.0 for the LaserWriter driver.

ROBERT K. ESKEW
WEST LAFAYETTE, IN

TEACH TEXT



To place pictures in *Teach Text* documents, type Option-space where you want the picture to appear. The pictures must be stored as resources of type PICT in the document, copied there by *ResEdit*. The first Option-space is drawn as picture 1000, the second as 1001, etc. Leave enough blank lines after the Option-space so the picture does not cover the following text. To make the document read-only, change the file type to "ttro." *Teach Text* will display additional lines of credits while holding down Command-option and selecting About Teach Text.

JEFFREY KRAUS
MADISON, WI

TEMPO



When composing macros, avoid the use of the cursor keys. Use the keypad equivalents instead. By doing so your macros will work both in *Word*'s outline mode and also in the regular text mode. Remember that *Word* assigns special outlining functions to the cursor keys but the keypad equivalents function the same in either mode. For example, to construct a type transposition macro, instead of — Shift-Left cursor arrow, Command-X, Left cursor arrow, Command-V, Right cursor arrow — use the following: Shift-4, Command-X, 4, Command-V, 6.

RODNEY J. DECKER
CARO, MI



When writing macros using *Tempo* 1.2 inside of an application, it can be tricky to save a file to a particular folder different than the one it was loaded from. *Tempo* starts at the main or root directory of the disk when doing a SAVE AS in a macro. Although one can use mouse clicks to step down through the folders, if you later add to or otherwise change the list of folders on your disk, this approach can land you in the wrong folder when using the macro. However, it's possible to set up the proper path by using the OPEN command first, before the SAVE AS. The OPEN command allows you to type the characters of the folder's name, and the inverse selection bar will automatically jump to the matching folder in the list. You can press Return and repeat this process until you've reached the folder that you wish to save the file in. At this point you CANCEL the OPEN and perform your SAVE AS to the subfolder that has now been set up. Even if you add a lot of new folders, your macro will still function correctly.

CRAIG PETERSON
SANTA MONICA, CA

TURBO PASCAL



While running a *Turbo Pascal* application in memory, here is a tip to interrupt the execution and quickly return to *Turbo Pascal*. With a 64K ROM Macintosh, simply press the programmer's switch interrupt button: just select the resume button in the dialog box (with an ID=99). But for 128K ROM Macintoshes when you press the interrupt button you enter the debugger. Simply type G A7 and press the Return key to go back into *Turbo Pascal*. If you have a debugger loaded, like *MacsBug*, just type "es" (exit to shell) and you will safely be returned to *Turbo Pascal*.

FEDERICO ZAPPI
CARACAS, VENEZUALA

Desktop Engineering



CAD, or computer-aided design, is establishing itself as a major new software category for the Macintosh. In this overview, we examine 24 of the leading CAD programs.

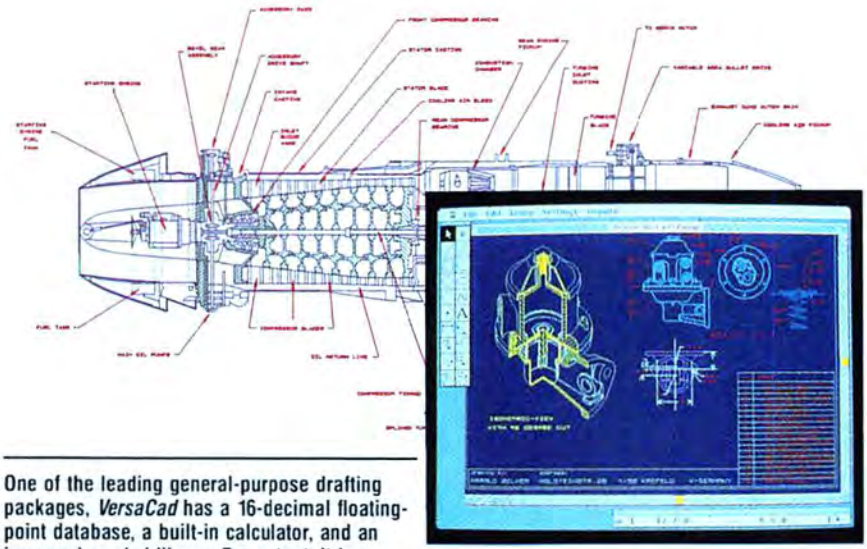
CAD (Computer-Aided Design) on the Macintosh originally meant pushing *MacPaint* and *MacDraw* way beyond their limits just to turn out simple bit-mapped sketches. The minuscule RAM, missing hard disk, and unnaturally small screen all made Macintosh-aided design seem more like toy-aided design. Still, sliding that mouse around the screen was a slick way to draw, and the built-in graphics interface did make the system easier to learn than the command-line, keyboard-oriented PC. What's more, adding stylish text with a variety of fonts to a drawing made it a lot easier to put together quick presentations, fliers, and the like.

The Mac grew up and acquired more RAM, hard disks, and more potent software. *MacDraft* and *MiniCAD* became the drawing and drafting tools of choice, and several 3-D drawing programs also appeared on the scene. Color and a decent-size screen were still missing, and because the Mac lacked slots, it wasn't easy to beef up its processor speed or graphics performance. The PC still had a clear advantage. Of course, software such as *PageMaker, Excel,* and *Word* gave the Mac an upper hand in presentations — something that engineers, designers, and architects find themselves involved in on a regular basis. So the Mac found a place in CAD, along with its powerful LaserWriter sibling.

That half-hearted acceptance of the Mac as a CAD tool (which was more commonly expressed as enthralled acceptance by some and snickering disdain by others) has been relegated to history. The Mac II with its slots, color, 68020, and math coprocessor was Apple's big step. Other companies came up with a score of large-screen displays, hard disks, plotter adapters, tablets, and software — lots and lots of software. So many CAD programs have appeared for the Mac in the past year and a half that it's impossible to write about more than a fraction of them in a single article. This is that article.

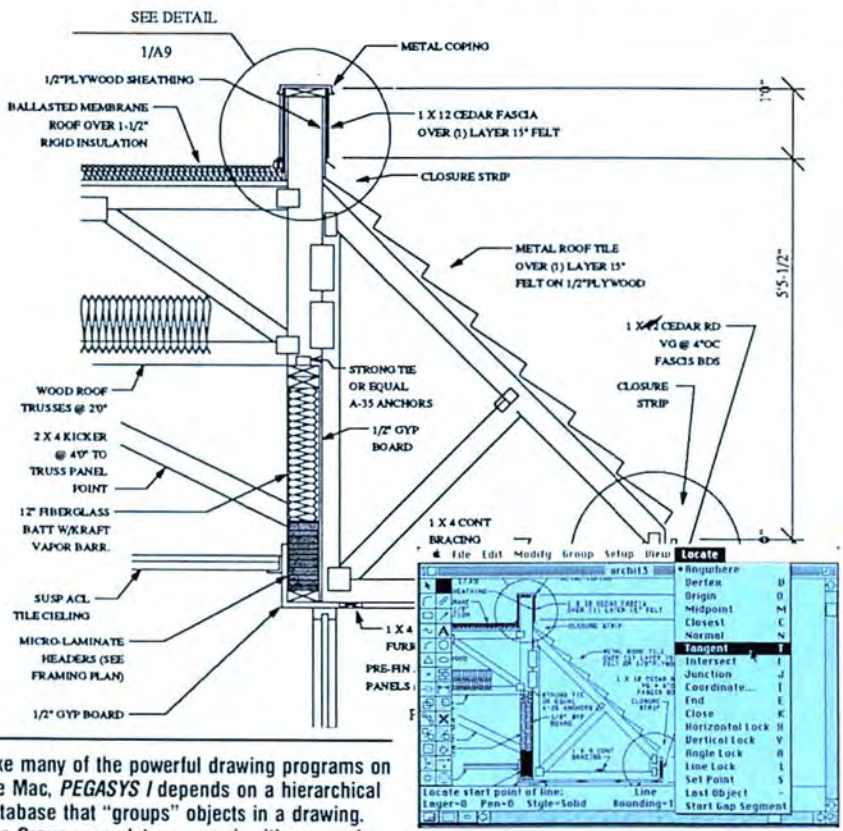
CAD is a loose term, used to describe everything from basic graphics programs to statistical-analysis software. In the generic sense, it should actually be called CADDD (computer-aided drawing, drafting, and design). Two- and three-dimensional

BY PHILLIP ROBINSON



One of the leading general-purpose drafting packages, *VersaCad* has a 16-decimal floating-point database, a built-in calculator, and an improved symbol library. For output, it has good printing and plotting abilities.

VersaCad comes with a *HyperCard* stack of help information. Using *MultiFinder* you can have this information side-by-side with the main program. The stack gives you details on using *VersaCad* commands and options by simply clicking on the relevant menu or tool.



Like many of the powerful drawing programs on the Mac, *PEGASYS I* depends on a hierarchical database that "groups" objects in a drawing. The Group menu lets you work with groups by their assigned names.

PEGASYS I has a large selection of locate or snap functions for precisely positioning lines and points. These functions can be employed either by choosing them from the menu or by holding down the assigned key while drawing with the mouse.

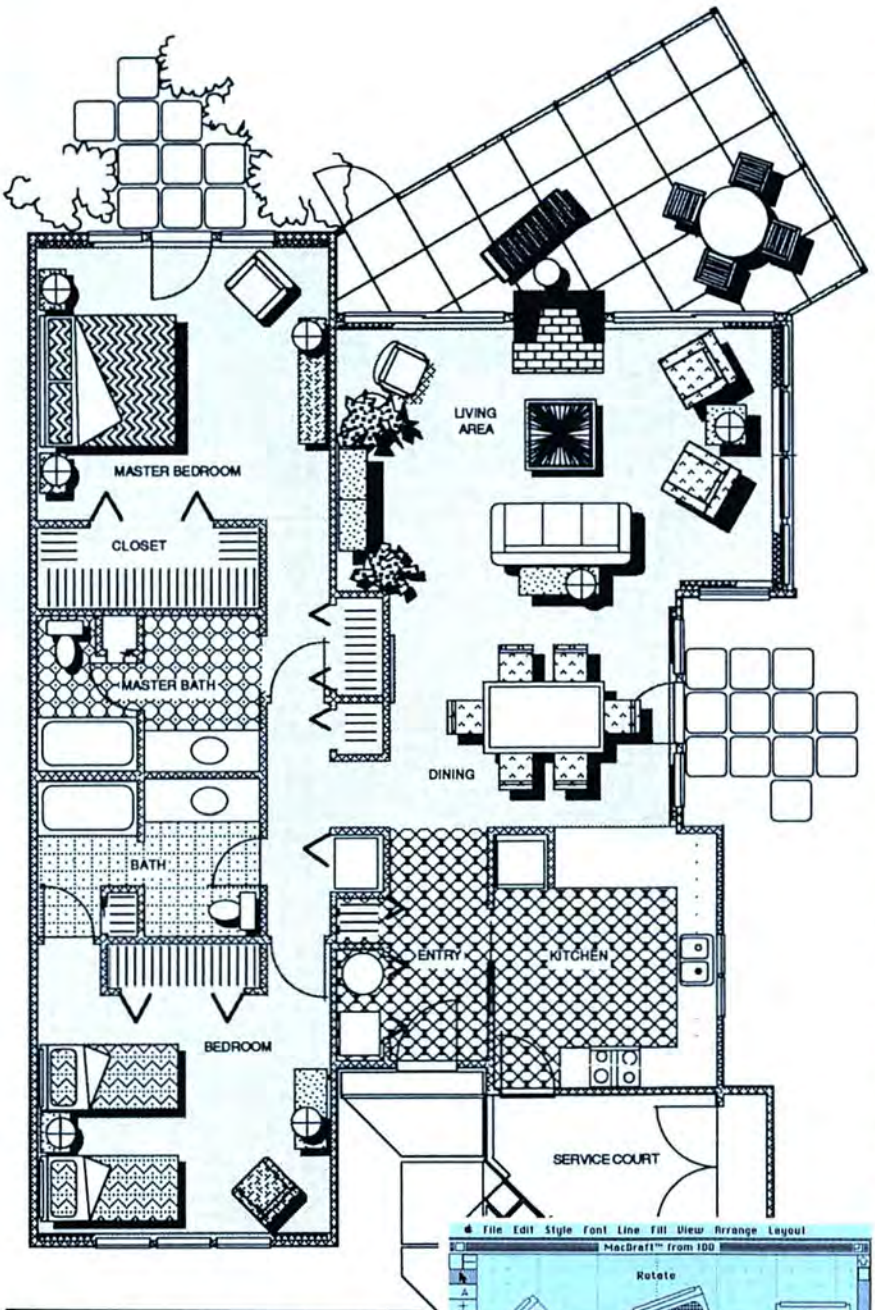
CAD is a loose term, used to describe everything from basic graphics programs to statistical-analysis software. In the generic sense, it should be called CADDD (computer-aided drawing, drafting, and design).

drawing are certainly at the root of CAD, but precise drafting, solids modeling, analysis of models, simulation of designs, and even manufacturing are all part of CAD. Even CASE (computer-aided software engineering) uses graphics tools and is frequently lumped in with CAD. Within a single category, such as 2-D drafting, there are different programs tailored to various users: mechanical engineers, electrical engineers, architects, weavers, industrial designers, and so forth. The Mac has some software for just about every purpose and type of user. This article describes the key features of the best-known or most powerful drawing programs in each category. (Other software packages, including analysis programs, are mentioned in the accompanying resource guide.)

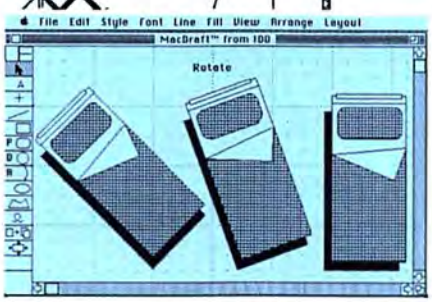
DRAFTING

Although simple graphics programs such as *MacDraw* or *Cricket Draw* can be used to create sketches and conceptions of circuits, buildings, or hardware, they can't hold a candle to the precision and accuracy of true 2-D drafting programs.

VersaCad: *VersaCad* is second only to *AutoCAD* in the DOS world as a professional drafting package. *Auto-*



A first step up from *MacDraw, MacDraft* offers zooming and object resizing along with some of the numerical accuracy needed in professional drafting. Its ability to read, write, and plot drawings is limited.



MacDraft can display the cursor position as a Cartesian coordinate. It has a built-in calculator for object areas and can rotate objects in 1-degree increments.

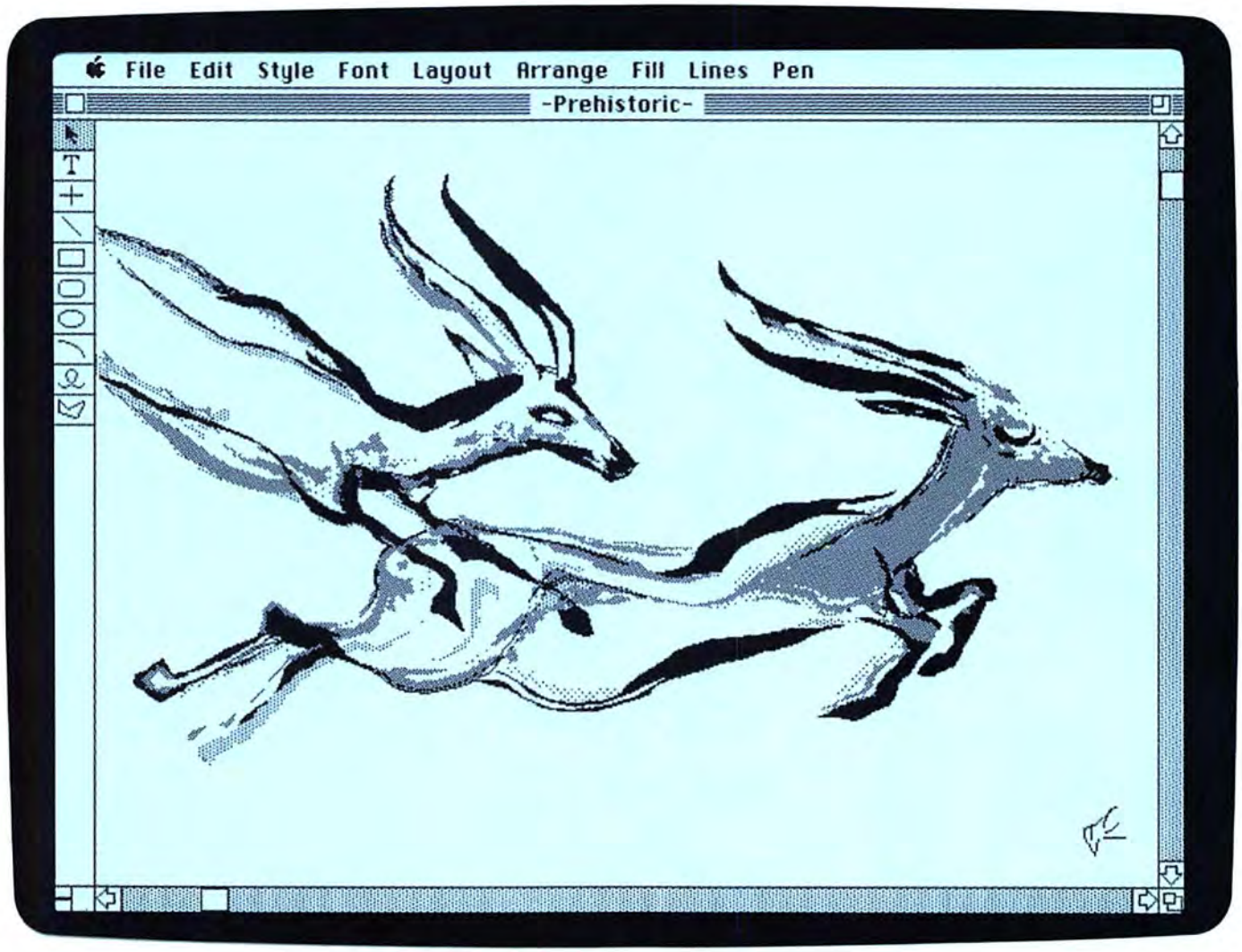
CAD hasn't appeared on a Mac yet, and the Macintosh Edition of *VersaCad* has already established itself as one of the leading general-purpose drafting packages for mechanical, electrical, and architectural work.

Although expensive for Macintosh CAD (at two grand it costs one-third less than comparable DOS packages but 30 to 100 percent more than other Mac CAD programs), *VersaCad* offers all the features and functions for professional CAD. It supports 256 colors (on the Mac II); has a 16-decimal floating-point database, a sophisticated built-in calculator, and a symbol-library function — and it provides vector-based cross-hatching. For output it has both printing and strong plotting abilities. Most of its drawing tools are organized on mobile tool palettes that you can position wherever they make the most sense for any particular application. The accompanying *VersaLink* program can translate files to and from the popular standards such as DXF and IGES. On the negative side, *VersaCad* can open only a single drawing at a time, has no 3-D abilities whatsoever, and does not display library symbols graphically. (For more details about the planned 3-D version, see "CAD and Mouse" in this issue.)

MGMStation: Micro CAD/CAM makes two Macintosh software packages that are sometimes confused. *MGMStation* is a CAD program; *MGMStation CAD/CAM* combines that CAD program with a CAM (computer-aided manufacturing) program (which is discussed later in this article).

MGMStation has automatic dimensioning; a variety of "snap" functions for anchoring or positioning objects; and sophisticated drawing commands for producing such things as fillets, chamfers, and tangents. Like *VersaCad* it provides a symbols library and cross-hatching. Printers and plotters are supported from within the main program.

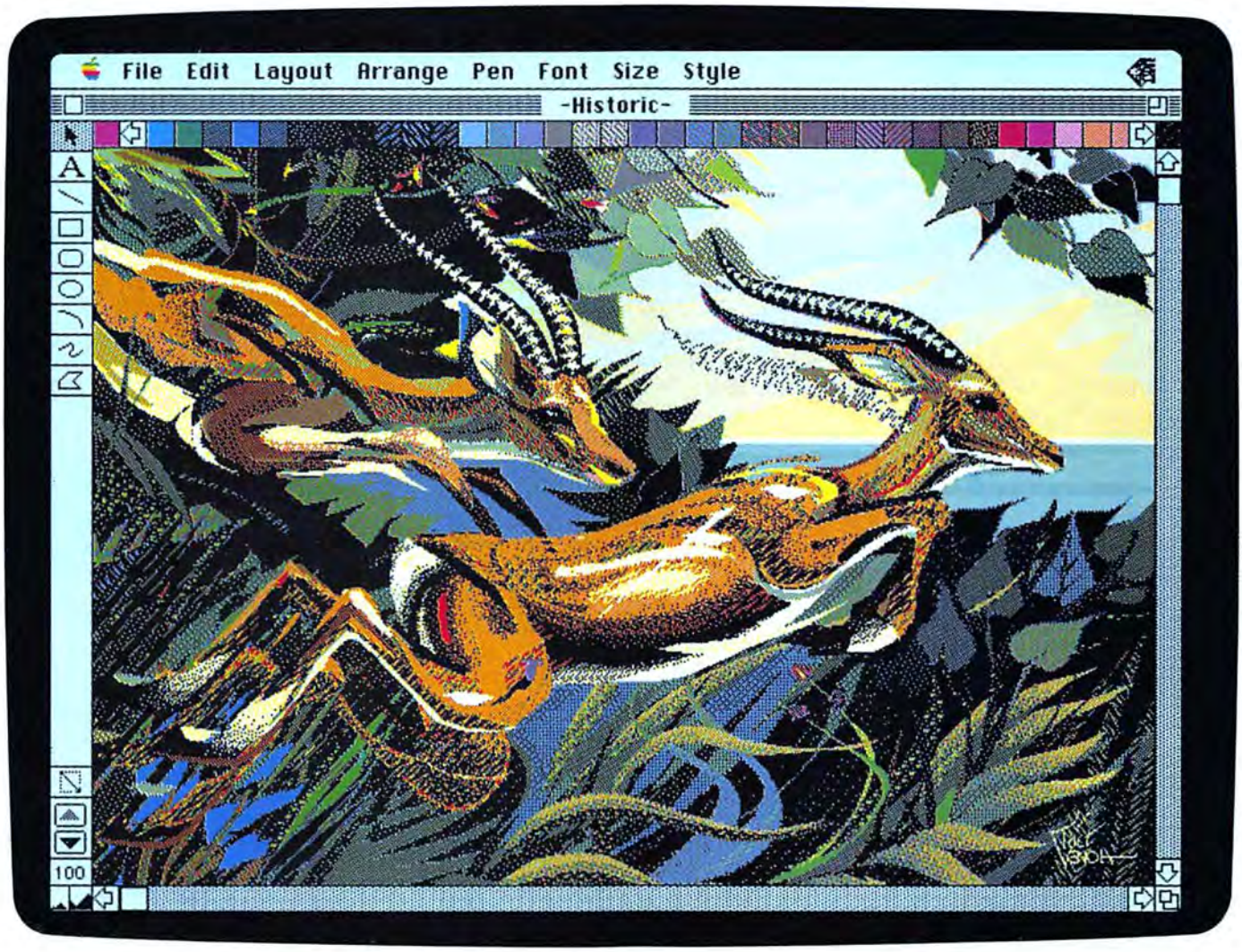
The biggest difficulty I have with *MGMStation* is that its interface is slightly different from that of most other Macintosh programs, particularly in the way you must use its icon tools. Also, its use of "groups" for sets



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of objects is difficult to adapt to at first, though it may prove to be a boon later, particularly when working with complex drawings. IGES translation is handled by a separate utility program. *MGMStation* is available in both black-and-white and color versions.

PEGASYS: *PEGASYS I,* the first in a promised line of CAD programs, is a 2-D drafting program. *PEGASYS Expert* will add 3-D, macros, and other advanced features to those of *PEGASYS I. PEGASYS II* is expected to include all the features of *PEGASYS I* and *Expert* and will optimize them for the speed and color of a Mac II.

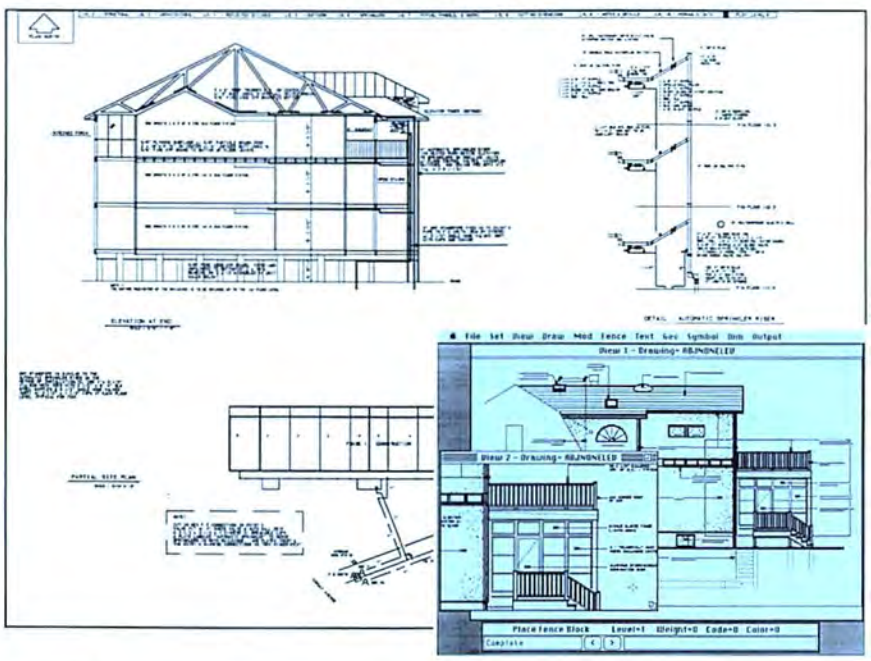
PEGASYS depends on "groups" of objects and can tell you the contents and specifications of any group or subgroup. Once you learn to think in this manner, it becomes a natural way to organize drawings and reuse portions of your designs. *PEGASYS* offers plotter-oriented (vector) text, allowing text rotation and manipulation that isn't possible with the bit-mapped fonts of simple drawing packages. It has a built-in calculator, a symbols library, and cross-hatching. The Snapping modes in *PEGASYS* are easy to use and subtle in their variety. Like *VersaCad, PEGASYS* is hampered by its ability to open only a single drawing at a time. It does not support color and is limited in its ability to read and write standard drafting files.

MacDraft: *MacDraft* was the first step up from *MacDraw* for many CADers. It offers features such as zooming and object resizing that *MacDraw* doesn't have and provides some of the numerical accuracy needed in professional drafting. For instance, it can display the cursor position as a Cartesian coordinate, has a built-in calculator for object areas, and can rotate objects in 1-degree increments. The corners of a rectangular object can be rounded with a constant radius or in proportion to the size of the object. *MacDraft* is very limited in its ability to read and write drafting files and to plot drawings.

MiniCAD: This was once the best-known CAD program on the Mac, and it competes with *MacDraft* as a drafting-table replacement. Unfortunately, it slipped back as other programs appeared. Now a new version, 4.0, is being offered, with some additional features and a price that is slightly less ($500) than the average Mac 2-D drafting program (typically $700). The new version touts its angular, diagonal, and chain-dimensioning feature as well as its ability to join objects and trim circles automatically. The old set of features is retained, including 2-D and some 3-D abilities, up to 40 layers, precision to 9 decimal places, a symbol library, filleting, and auto-alignment.

SNAP: *SNAP!* has most of the major drawing features — a symbols library, vector text, auto-dimensioning, precision using keyboard numeric entry, and so forth — that make CAD so preferable to pen and paper drawing. But it also has a particular strong point within the computer-aided realm: It is based on the drawing standard of Intergraph CAD. Intergraph is the second-largest CAD company (after IBM), and its dedicated workstations can be found throughout the world. *SNAP!* follows the Macintosh standard in most ways, but its design goal of operating as a front end to an Intergraph system warps the Mac interface a bit. You don't need to be an Intergraph user to like *SNAP!,* but if you are, *SNAP!* should be at the top of your list to give a test drive. *SNAP!* supports plotters, laser printers, and PostScript output, and it handles color on the Mac II. It can produce IGDS files that are directly usable by Intergraph stations.

PowerDraw: *PowerDraw* is not in the same league as *VersaCad* or *MGMStation,* largely because it offers no file-translation path. It's more like a powerful cousin of *MacDraft* and *MacDraw,* with their PICT files. It adds symbol libraries, extensive plotter support, more line types and thicknesses, and layers (up to 120) to a base that is similar to *MacDraft.* For precision, it can calculate the dimensions of an object, and it allows you to enter numeric dimensions at the keyboard. In *PowerDraw* you can open as many as 20 drawing windows at a time



Acting as a front end to an Intergraph system causes *SNAP!* to warp the Macintosh interface a bit. But it supports plotters, laser printers, and PostScript output as well as color on the Mac II.

***SNAP!* has all of the tools found in other CAD programs and is based on the drawing standard of Intergraph CAD.**

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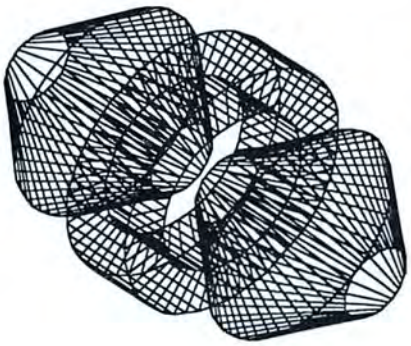
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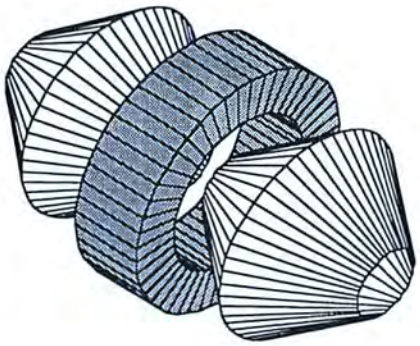
and can assign 10 different views of a single drawing. It does support color and even has a "time log" feature for tracking how much time you've spent on a drawing.

SOLIDS MODELING

Drafting can mean designing 2-D or 3-D objects, though few professional-level Macintosh drafting programs have much (or any) 3-D ability. (This is less true in the DOS world, where drafting programs such as *AutoCAD* have limited 3-D functions and features.) The tag "2.5D" is used for programs that can assign simple elevations (z-axis settings) to points or objects but cannot handle complex manipulations in three dimensions. (The architectural programs listed later are an exception to this rule, combining 2-D and 3-D abilities.)

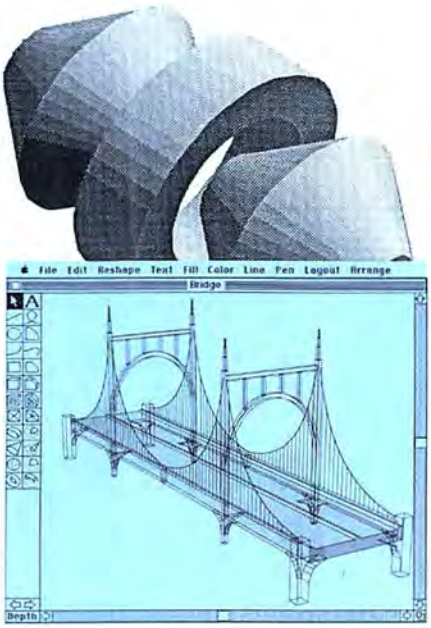
The Macintosh does play host to several 3-D CAD programs, however. Most of these can be classified as solids modeling programs because they go beyond simple "line and edge" drafting of 3-D "wire frames" to portray fully shaded objects with correct perspective and a variety of viewpoints. The process of hiding lines that can't be seen, calculating lighting and shading, and placing a model into perspective is called rendering.







The tool box in *Mac3D* includes basic 2-D objects, 3-D torus elements, prisms, and full-sectioned cones and spheres. A "revolution" command can move 2-D objects into 3-D space.



A cornerstone in Macintosh design for years, *Mac3D*'s latest version, 2.1, adds color and a HELP command. While color printing is possible with any Mac, a Mac II is required for color screen display.

Mac3D: *Mac3D* has been a stalwart in Macintosh modeling for several years. The latest version, 2.1, adds color and a HELP command to the full set of features in previous versions. Color printing is possible with any Mac, although a Mac II is required for color screen display. You can shade the colors for both tint and pattern and can also control opacity and hidden-line removal. The toolbox includes basic 2-D objects, 3-D torus elements, prisms, and full and sectioned cones and spheres. A REVOLUTION command can move 2-D objects into 3-D space. A GEODESIC SPHERE command lets you choose the number of nodes for the sphere, and several commands allow rounding, beveling, and reshaping of objects. You can select objects for editing by pattern or type, and you can align, group, or explode objects. *Mac3D* has zooming commands for changing the view of a model and can save models in its own or in the PICT format.

Design and ***Solid Dimensions:*** Visual Information offers two powerful Mac CAD programs — *Design Dimensions* and *Solid Dimensions* — and several related utility programs.

Design is a 3-D drawing and drafting package that's competitive with the drafting programs already mentioned and can work in color on a Mac II. *Design* not only has 2-D drawing features but is also well endowed with functions such as spline curves, rotation, extrusion, and lathing that can transform a 2-D object into a 3-D model. It comes with a symbol library and is organized around hierarchical groups of objects. *Dimensions Interpreter* is a utility program for moving files between the DXF, PICT, and *Dimensions* formats. *Animate Dimensions* can create smooth animation of *Dimensions* models.

Solid Dimensions can read *Design Dimensions* files directly and then ren-

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der them using the full 16.7-million-color palette of the Mac II. You can select any viewing position and light source and select from several different methods for rendering the surface of the 3-D model. Recently, Visual Information added stereoscopic 3-D viewing, by which you can view the models through 3-D glasses for a realistic 3-D appearance. *Solid Dimensions* makes the most realistic color models I've seen from a Macintosh. Although these renderings can sometimes take hours to process, they would not be out of place in a professional videotape environment.

Super 3D: Although it was still in beta testing as I finished this article, *Super 3D* seems destined to make a splash in the modeling market. It is intended to build and animate wireframe and solid-surface models. Like *Word* it will offer both short and long menus and is fully adapted to the Mac II's math coprocessor for speed. Plans call for *Super 3D* to be able to print up to 64 shades of gray on a PostScript device and to be able to play back saved views of a model at up to 60 frames a second for animation. Using the Expanded Video Card from Apple and a dithering technique, *Super 3D* should be able to display more than 16,000 shades of color for both objects and light sources on the screen. It should also be able to read and write standard 3-D files from other applications and to export PICT or Encapsulated PostScript files for use in desktop-publishing software.

CAM

The milling machines and lathes that carve mechanical objects out of metal, plastic, and wax are controlled by numeric programs. Most have a simple computer built in that converts a series of numbers and instruction codes into movements of a mill, lathe, or drill bit. Until the past few years, that series of numbers and codes — that CAM (computer-aided manufacturing) program — was created and edited on a minicomputer or right at the milling station itself. Now, a Mac-

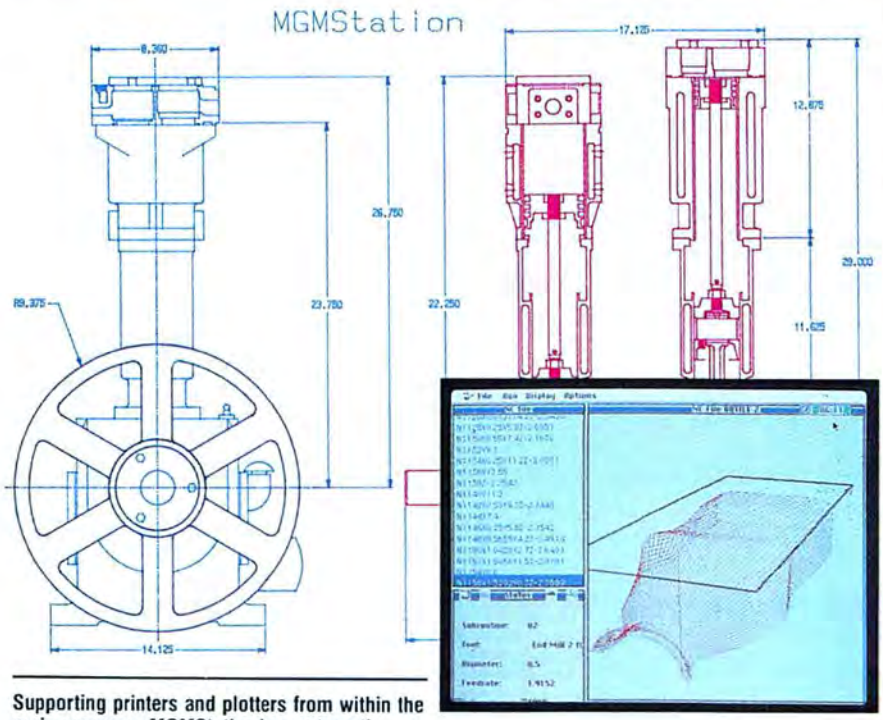
> ***M****GMStation* is one of the most popular Macintosh CAD packages. *MGMStation CAD/CAM* holds the same position in the CAM community.

intosh with the right software can extract such a program from a 3-D graphic model.

MGMStation CAD/CAM : Just as *MGMStation* (CAD) is one of the most popular Macintosh CAD packages, *MGMStation CAD/CAM* holds a solid position in the CAM community. It has been the endpoint of integrated-manufacturing demos by Apple at computer shows, where a design began as a written specification, was drafted in *VersaCad,* moved through several other stages, and ended up in the hands of *MGMStation* for cutting from wax on a Roland Mill. *MGMStation CAD/CAM* has several modules, beginning with the complete drafting abilities of its namesake and including Milling and Turning (for mills and lathes, respectively).

It can work with libraries of different cutting tools, show a graphic image of the tool path to follow, and compensate automatically for missing or worn tools. It comes with a generic post-processor for converting its files into the proper form to be read by common machine tools.

Mac EZ-CAM: Bridgeport has been making milling machines and other machine tools for years. The company offers a full suite of CAM

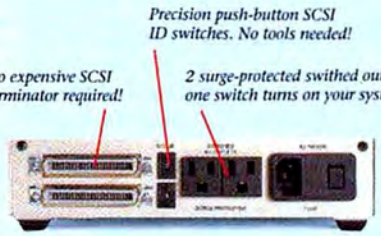


Supporting printers and plotters from within the main program, *MGMStation* has automatic dimensioning, a variety of snap functions for anchoring or positioning objects, and sophisticated drawing commands.

***MGMStation* has an unusual interface, with many of the commands available as drop-down menus from a main menu on the left edge of the display.**

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programs, on both the DOS and Mac sides of the fence.

Mac *EZ-CAM,* the Macintosh set of programs, includes *EZ-Turn* (for lathes), *EZ-EDM* (for electric-discharge milling machines), *EZ-Mill* (for mills), and *EZ-Surf Plus* (for full 3-D sculptured surfaces). Until recently these programs did not adhere to the Macintosh standard interface, but they have all been brought up to speed in that respect. They can accept files from any CAD program that outputs IGES or DXF format. *EZ-Surf Plus* works with "sculptured" surfaces, 3-D surfaces that curve along several axes at once. Other CAM programs are moving toward this ability but aren't yet offering it commercially. Mac *EZ-CAM* comes with a library of standard postprocessors and a program for customizing a postprocessor to mills not found in the library.

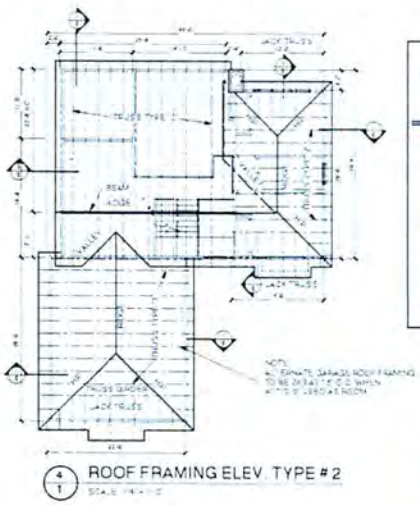
ncCAD/ncCAM: *ncCAD/ncCAM* is also a suite of drafting and milling modules, like Mac *EZ-CAM,* and is often sold as a complete set along with hardware and even machine-shop billing and job-tracking software. *ncCAD* is not a full-fledged CAD program along the lines of *VersaCad,* but it does have all the features for creating and modifying 3-D models. Other *ncCAD/ncCAM* modules can translate and import IGES and DXF files from other CAD software. *ncCAM* allows the machinist to create a tool path for cutting an object. After setting up a library of tools with different materials and sizes, this module lets the machinist dictate cutting speed and level and the shape to cut. The program then automatically draws a tool path around the shape, intelligently taking into account and avoiding the edges that could accidentally be cut off at corners and indentations. It can also cut out "pockets" or concave holes within the surface of an object (even cutting them in the shape of letters, or "engraving"). *ncCAM* can compensate for cutting-tool changes. It comes with a large library of postprocessors for various mills and lathes, and Gibbs and Associates promises to create a postprocessor for any customer's machine that is not on the list. A new *ncSurfaces* module is in testing and will provide sculptured-surface features.

ARCHITECTURAL

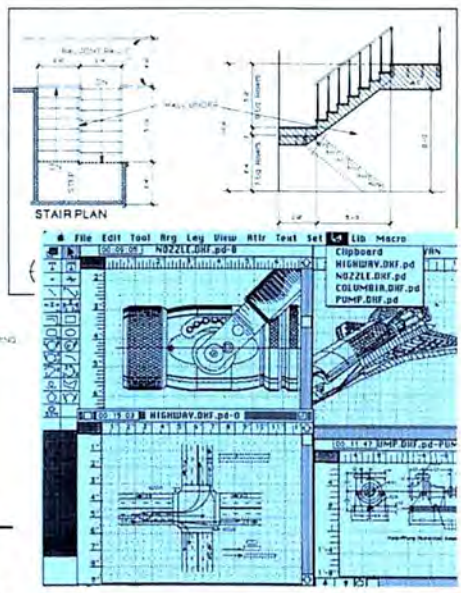
The programs I've described up to this point have been general-purpose tools. Many of them even come with example drawing files taken from a variety of job sites: mechanical, architectural, civil, electronic, and so forth. There are some drawing programs available that are tailored to specific types of work, though. The architectural CAD packages, for instance, combine 2-D drafting and 3-D modeling features with standard architectural fill patterns, views of the drawing, and drafting terminology. (By the way, for some reason, several of the most important architectural Mac CAD programs were originally developed in France, including *SpaceEdit* and *MacArchitrion*).

SpaceEdit 2.0: *SpaceEdit* 2.0 is more oriented to architectural work than are most CAD packages, but it has enough general-purpose power to make it a credible 2-D and 3-D package for mechanical or other types of drawing too. It can show four different views of a single drawing at a time and can work from mouse, keyboard, or digitizing-tablet input. For perspective, you can see a model with zero, two, or three vanishing points from any vantage point. *SpaceEdit* can remove hidden lines automatically and can shade models, and you can use it to define surfaces as opaque or transparent for solids modeling. It sets up to ten screen views and has a 2-D and 3-D objects library, automatic dimensioning, area and perimeter calculation, and a variety of snap tools. For more realistic viewing of a building model, you can create a "fly by" or "walk through" by choosing a viewpoint path and automatically stepping through it. The Heliodonic feature lets you see the shadows cast by the sun on your building, working from any latitude in the world. *SpaceEdit* doesn't offer cross-hatching or fill patterns for 2-D plotting or printing.

MacArchitrion: Like *SpaceEdit, MacArchitrion* is a French product, but unlike *SpaceEdit,* it is not really suited to anything other than architectural drawing. All of its drawing elements and commands are tailored specifically to creating and modifying 2-D and 3-D building shapes. It is built around three main modules — 3-D, 2-D, and Quant — and a set of symbol libraries.



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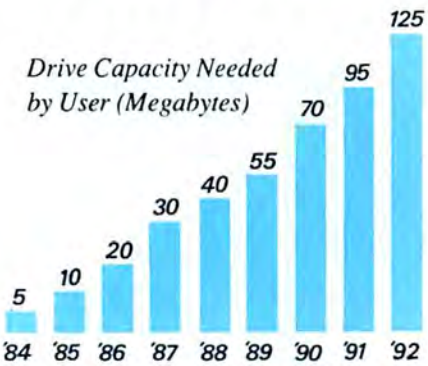


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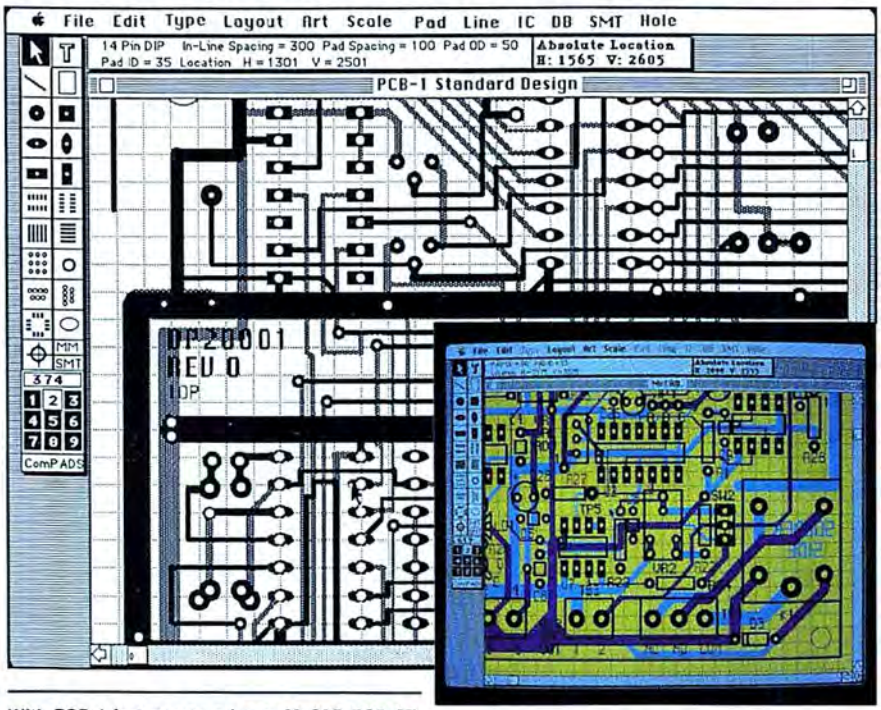
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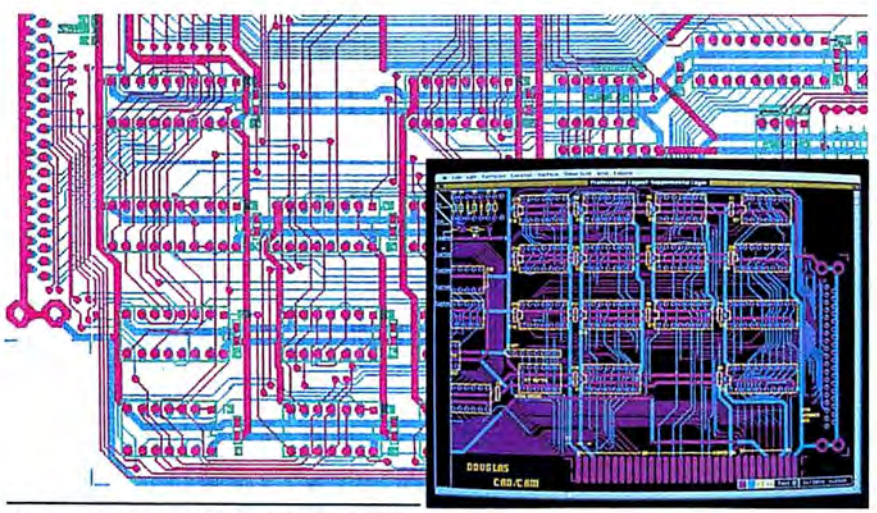
The 3-D module is central; it is the tool for creating buildings from blocks. You can stretch, cut, skew, and otherwise shape blocks in three dimensions, joining groups of blocks into walls, roofs, and so forth. You can create complex objects such as domes and spiral staircases by copying blocks in patterns. All these functions are available both as palette icons and as menu choices. You can set the objects to be shown and the objects to be hidden in any model and can export 2-D views of a model to the 2-D module for adding details, dimensions, and labels. The 3-D module has a Heliodonic feature much like that of *SpaceEdit*.

The Quant module can extract the numeric specifications for the model you build, exporting them as a text file or as a spreadsheet SYLK file that you can then analyze in *Excel*. Switching from one view of a model to another takes very little time, but *MacArchitrion* is limited to displaying a single view of a single drawing at any one time. Its libraries include a wide variety of bit-mapped and vector fonts and fill patterns, and it has a cross-hatching function. Plotter and printer support is built into the program.



With PCB-1 features as a base, *McCAD PCB-ST* also has auto-routing, colored layers, and a larger elements library.

The *McCAD PCB-1* is aimed at creating on-screen representations of PCB artwork, which can be put out to a printer or plotter. Its symbol library includes Surface Mount patterns.



The *Douglas CAD/CAM Professional System* has a Schematic Design module from Capilano Computing that allows you to create circuit schematics and then simulate and test them.

In addition to its library of part patterns with standard hole and pad setups, the Professional layout module allows you to store your own patterns.

ELECTRICAL

Electrical and electronics CAD programs can cover a lot of territory, from the initial logical design of a circuit through schematic capture (the graphic drawing of the circuit) and routing (the manual or automatic interconnection of circuit parts) to simulation of the circuit's operation and even manufacture of the printed circuit board or chip that comprises the circuit. This process is often called CAE. Again, the Macintosh is now represented at all stages of this odyssey, though digital logic is better represented than analog logic in the electronics arena. The following two programs are the best-known graphics drawing packages.

Douglas CAD/CAM Professional System: Douglas makes both printed circuit boards and Macintosh software to aid in design of printed circuit boards. The *CAD/CAM Professional System* is a complete PCB system that includes features for laying out a board, simulating its operation, and manufacturing it. The Schematic Design module comes from Capilano Computing and lets you create circuit schematics and then simulate and test them (using a logical "probe"). It comes with a library of thousands of standard analog and digital parts. The layout module comes with a library of part patterns with standard hole and pad setups. You can also store your own patterns. The AutoRouter can route up to 16 layers simultaneously, reading the lists from the schematic design and the layout file from the layout module. The routing attempts to minimize the number of bends and

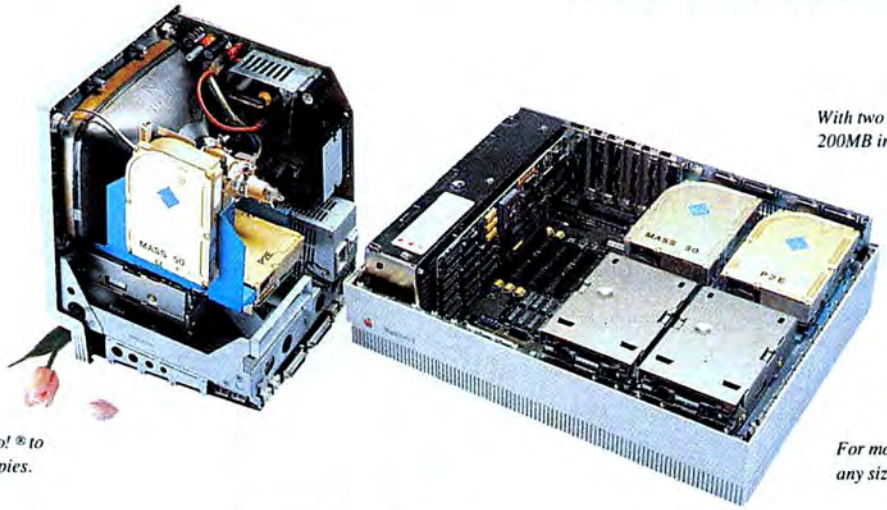
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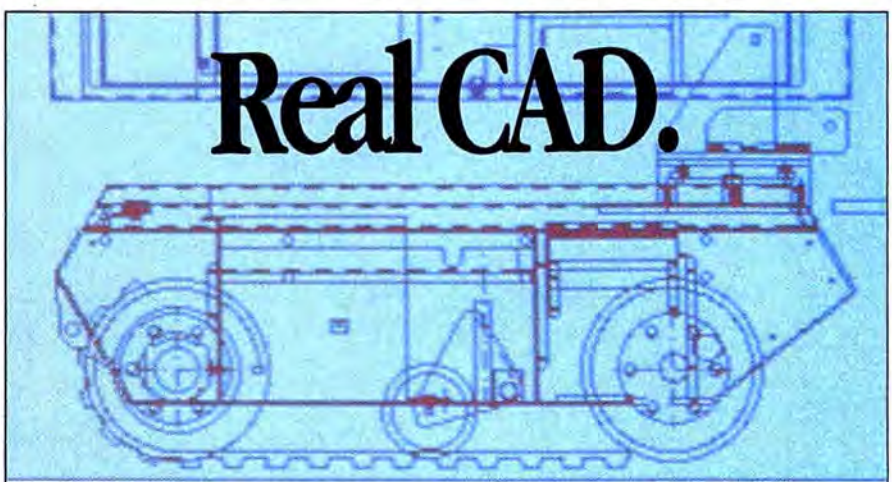
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vias using multiple passes. Finished layouts can be printed or can be sent through a modem to Douglas for output as artwork or — in a form of electrical CAM — as finished boards.

McCAD: The VAMP set of electronic CAD programs is not quite as integrated as the Douglas System is, but it is broad and powerful nonetheless. *McCAD Schematics* helps engineers create digital and analog circuit designs. It has an interconnect router, device libraries, the ability to generate parts lists, and links for other *McCAD* programs. *McCAD PCB-1* is aimed at creating on-screen representations of PCB artwork that can then be printed or plotted. It includes a library of standard elements, including Surface Mount patterns. *McCAD PCB-ST* starts with *McCAD PCB-1*'s features and adds auto-routing, colored layers, and a larger elements library. The files it produces can be used directly by some photoplotters. *McCAD EDS-1,* which runs only on the Mac II, includes a Schematic module, PCB module, Routing module, and Output module. Although VAMP does not itself make boards, the *EDS-1* package approximates the extent of the Douglas System, though without the circuit simulation or testing.

CONCLUSION

The Mac II slipped into design and engineering as a presentation tool but moved up to the status of a front end for more powerful CAD systems. It has now graduated to the status of a full-blown CAD platform, though it is still not as fast nor does it have software as powerful as what you find on 32-bit workstations (such as those made by Apollo and Sun). It certainly doesn't lag behind DOS machines in power anymore and, with the key exception of *AutoCAD,* it has a fully competitive software library. The Mac can be found in virtually every field of CAD from those mentioned above to more obscure categories such as chemical CAD and textile CAD.

PHILLIP ROBINSON, A FORMER ENGINEER, IS THE EDITOR OF DESKTOP ENGINEERING NEWS. THIS IS HIS FIRST CONTRIBUTION TO MACUSER. IN ANOTHER LIFE, PHILLIP IS LEARNING TO PLAY THE VIOLIN, AGAIN.

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Products mentioned in the main body of the feature are indicated with an asterisk (*) in the following list.

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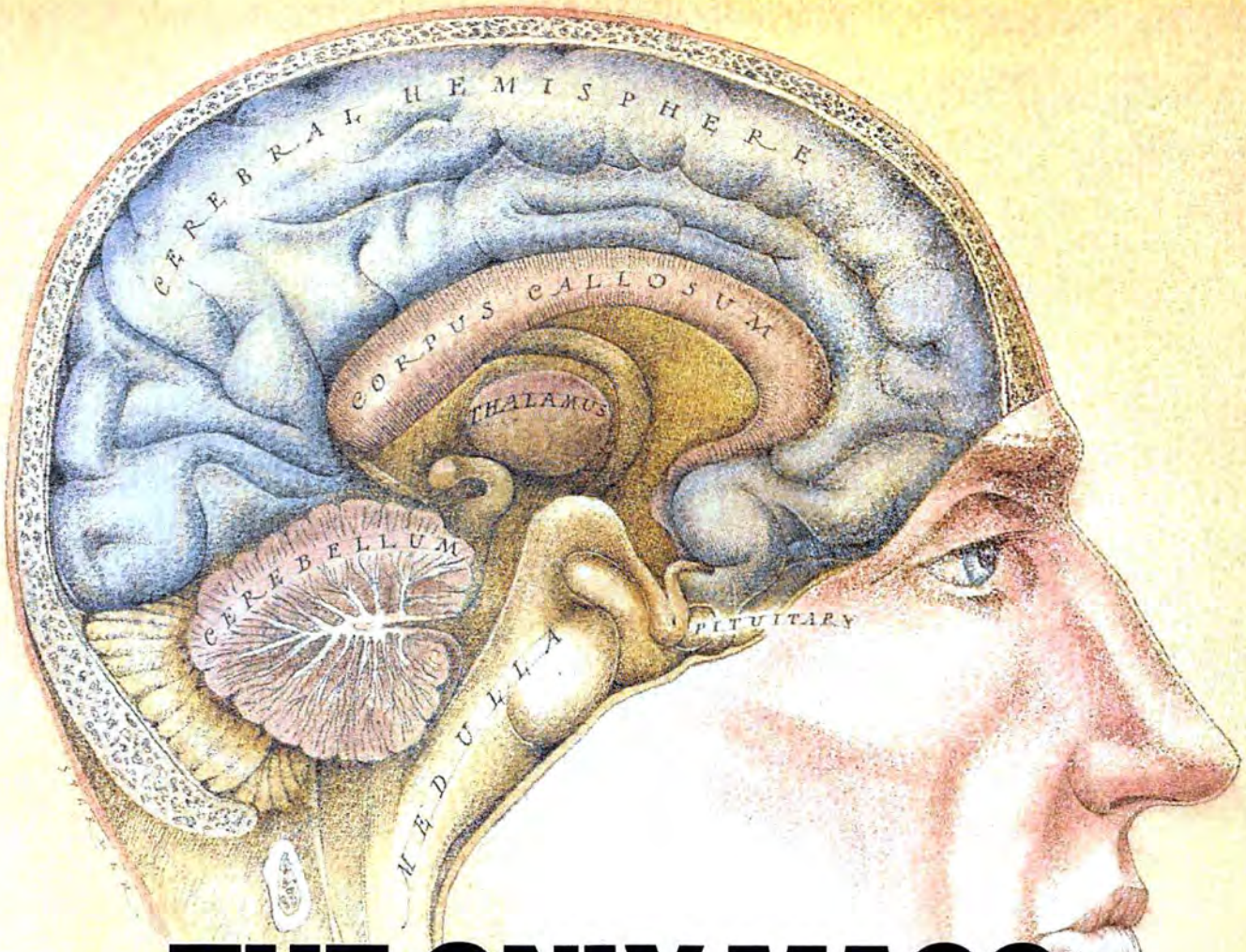
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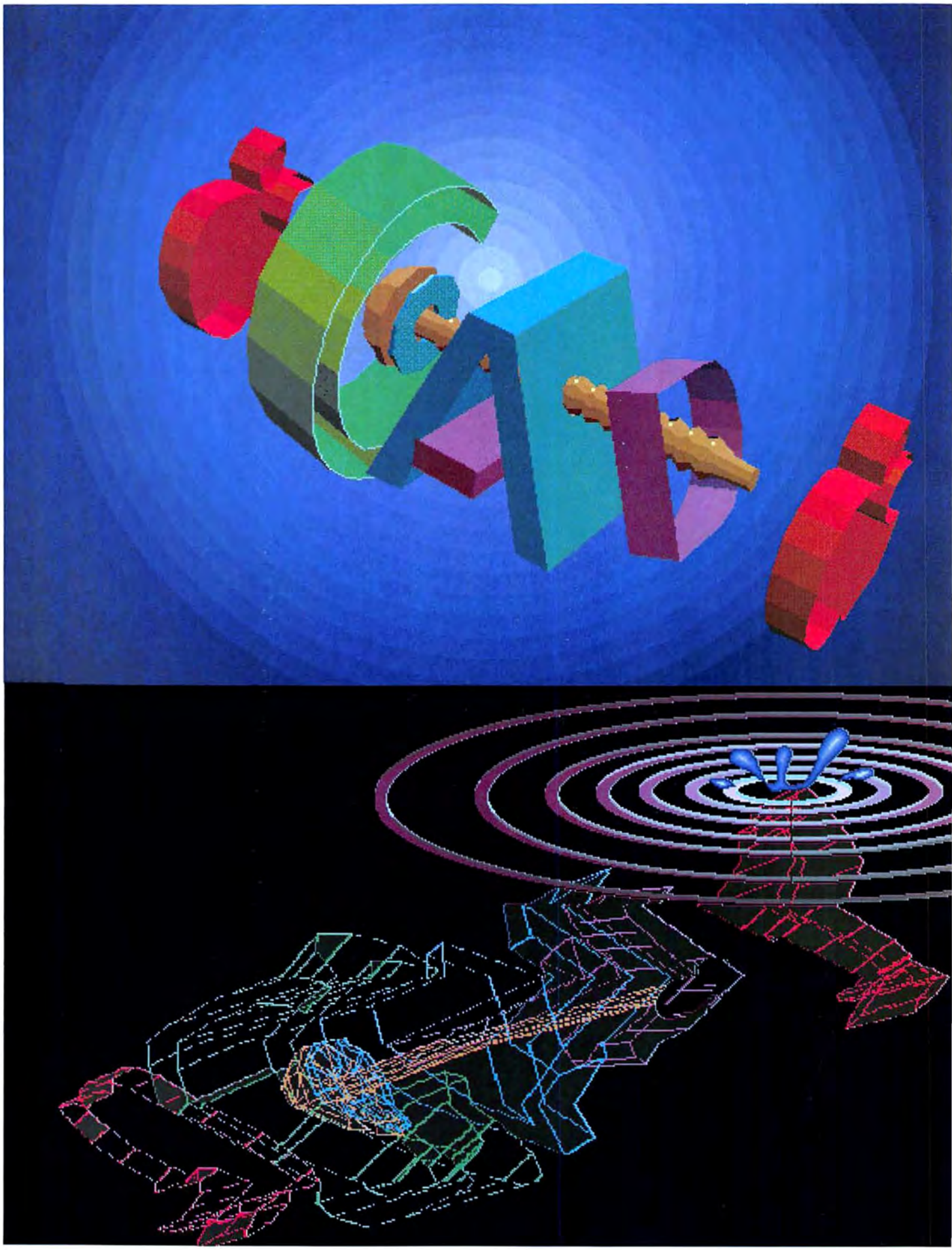
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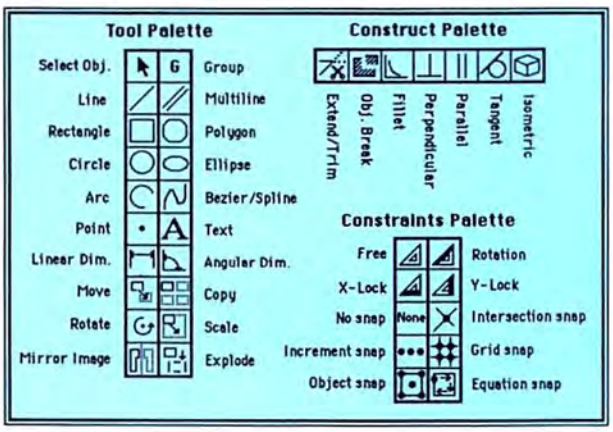
CAD and Mouse

Since the unveiling of the Macintosh II as Apple's engineering workstation, engineering professionals have been waiting for a product to utilize its capability to the fullest and prove once and for all that the Macintosh is indeed one of the best platforms for engineers and designers. Such a product recently made its appearance in the form of *VersaCad, the Macintosh Edition*, a full-featured, computer-aided-design and -drafting program from VersaCad Corporation of Huntington Beach, California.

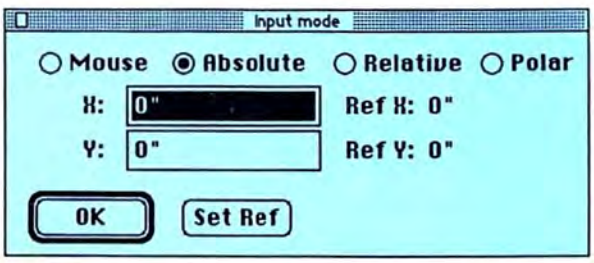
VersaCad for the Macintosh is a general-purpose 2-D computer-aided-design program and as such contrasts with some of the recently introduced drawing packages, such as Vamp's *McCad* and DKL Technology's *MacGDS*, which are targeted at more specialized markets. A general-purpose CAD program must be able to handle a variety of drawing types, including architectural, electrical, mechanical, and mapping. The Mac version's tool palette may appear to be too simple to experienced CAD users, who may be tempted to dismiss the software as a less capable version of VersaCad's similar product for IBM machines. They would be very wrong to do so, though — the Macintosh version sports a complete set of drawing functions.

BY FRANK CONFORTI

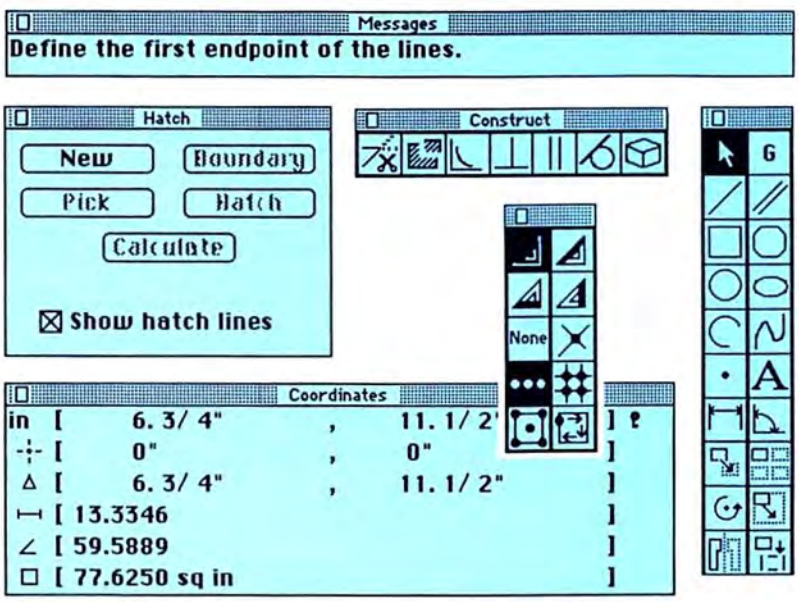
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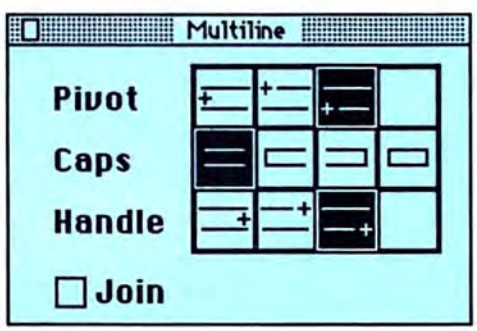


VersaCad's on-line help screen. A much better help system is provided in the VCAD Help *HyperCard* stack.



The plethora of tool palettes and information windows *VersaCad* presents to users. Note the use of the "new" window-bar style used to conserve screen space.





A typical object-specific window that allows you to set specific options for an object.

VersaCad is designed to run on the Macintosh Plus, SE, and II, although its performance is best described as slow when run on either of the lower-end machines. This is because of the large number of floating-point computations *VersaCad* performs. If you're using a Mac Plus or SE and find the program's speed unacceptable, you should invest in a math coprocessor, which is usually an option on most Mac accelerator boards.

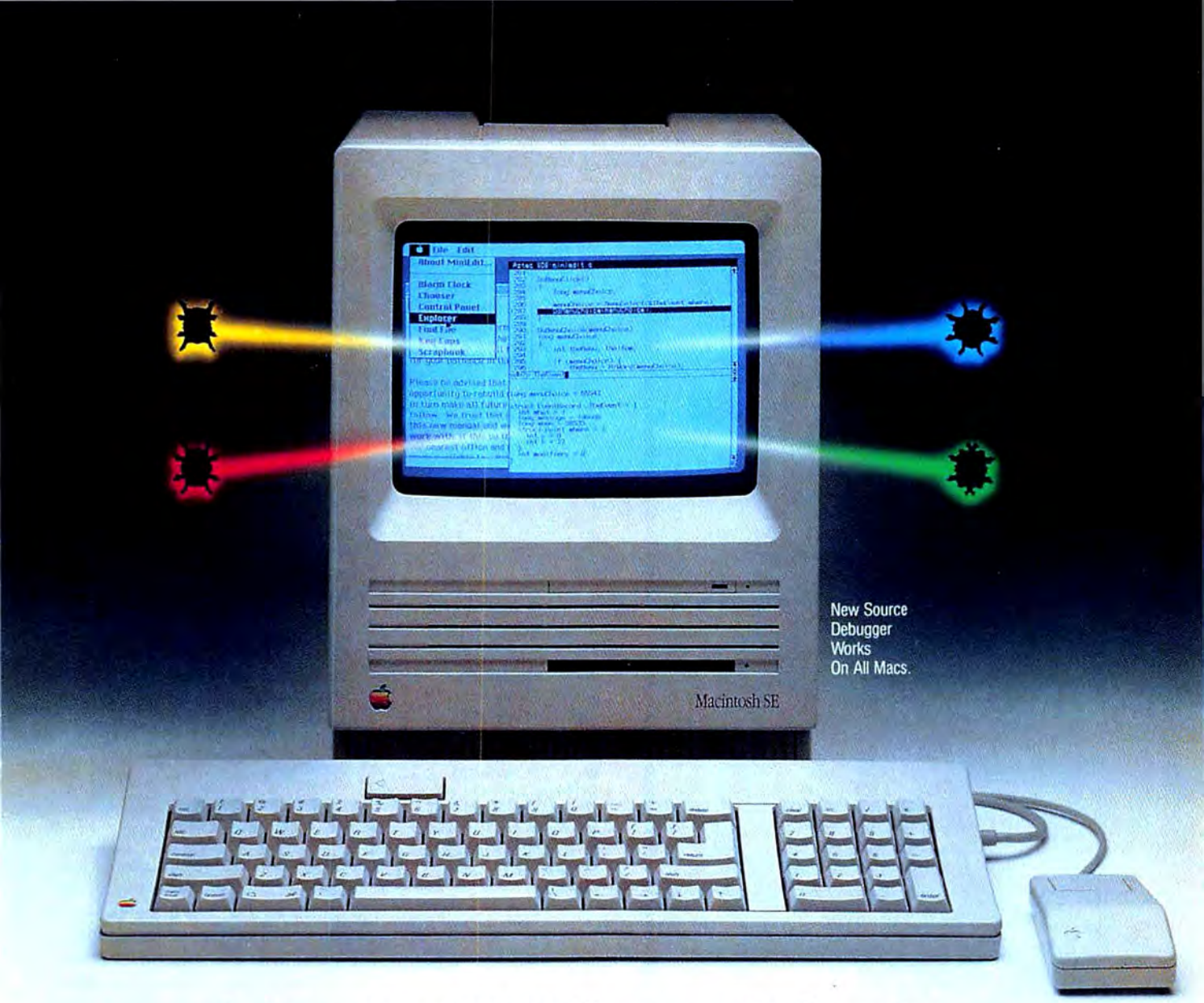
What you see when you launch *VersaCad* is the familiar Macintosh drawing window with a tool palette on the left edge of the screen. Above and below the drawing window are two less familiar features: the Messages and Coordinates windows. *VersaCad* uses a plethora of windows to present you with all sorts of tools and information. A large screen is helpful for no other reason than to allow you to display all the different windows.

OBJECTS AND PROPERTIES

The tool palette gives you access to both the insertion and manipulation of drawing objects. You'll find all the major elements commonly used in CAD, including lines, arcs, dimensions, and curves. You set object-specific parameters such as a circle's radius by double-clicking on the relevant icon. You then get a dialog box that allows you to enter the appropriate information. Common information or "properties" shared by all objects, such as color and line style, are set before you select the object icon.

Whenever you use a command that requires you to provide information, the program will prompt you through the appropriate steps via the Messages window — for instance, when you place fillets, *VersaCad* asks you to identify the first and second object on which to place the fillet. The Messages window is very important to the operation of *VersaCad*, so pay close attention to what the Mac is "saying" in this window.

Properties are to *VersaCad* what line patterns and thicknesses are to *MacDraw;* however, in *VersaCad* all properties are related only to the final output of the drawing. *VersaCad*, for example, displays all lines at the same



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Build Time (sec)	16	25	22
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Run Time	258	299	299

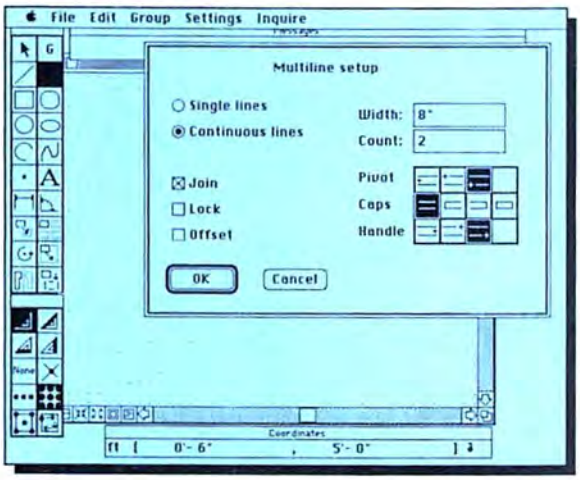
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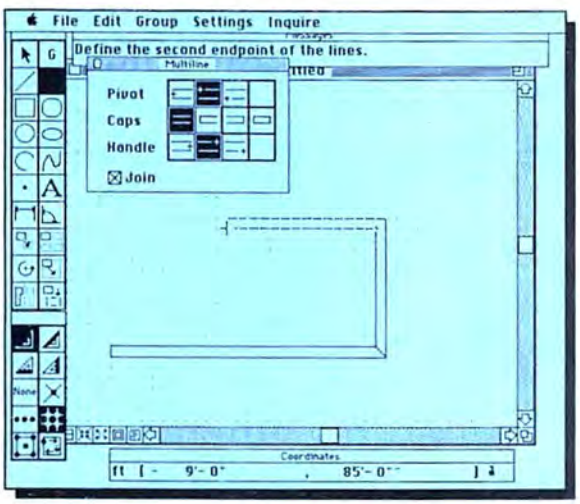
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The MULTILINE settings menu. The spacing between the lines and the number of parallel lines are entered in their respective places, here being set to represent an 8-inch wall.



The MULTILINE command in use. Note how the options palette associated with this command remains visible on the drawing during use of this command. Note how the wall was started with an end cap and how it has been set to open for the remainder of the MULTILINE command.

What *VersaCad* does instead is to require you to insert all objects using multiple mouse clicks (for example, two clicks to define a line). This approach may seem un-Mac-like, but it's a compromise that's justified.

one-pixel thickness, regardless of how thick they will ultimately appear when plotted or printed. *VersaCad*'s goal is to generate accurate drawings utilizing full plotter or printer capability rather than WYSIWYG.

One of *VersaCad*'s major virtues is that it supports a large array of useful elements, or objects. One of the more interesting objects is Multiline, which consists of two parallel lines a set distance apart, such as those architects commonly use to create walls. When you select Multiline, *VersaCad* presents you with an option window that lets you select how the lines are drawn. The options in this window include how the lines are drawn with respect to mouse clicks, how the ends of Multilines are terminated, and what to do when one Multiline ends on another Multiline (for instance, whether it should be "joined" or not).

This form of object control highlights one of the shortcomings of the "standard" Mac interface that *VersaCad* had to overcome. In the normal Mac world, all you have to do when inserting objects is click and drag in order to define the length of a line or diameter of a circle. With objects such as Multilines, this isn't possible because of the need to adjust the object being inserted. What *VersaCad* does instead is to require you to insert all objects using multiple mouse clicks (for example, two clicks to define a line). This approach may seem un-Mac-like, but it's a compromise that's justified. The use of this technique is consistent throughout the program, including zooming windows.

You use the other icons on the tool palette to manipulate previously inserted objects. Manipulations include copying, rotating, scaling, exploding, and moving. The EXPLODE function breaks an object into its components — for instance, an exploded Multiline object becomes a host of individual lines. Most of these functions have double-click options that give you a significant amount of control over the manipulation command. One notable exception is the ROTATE command, which lacks a way to specify the number of degrees of rotation.

Instead of *MacDraw*'s REDUCE and ENLARGE commands or *MacPaint*'s FatBits, *VersaCad* uses window icons to control the drawing window's display. You use the icon on the far left to select the maximum drawing size. One point needs to be made about the term *drawing*. With most Macintosh products, the output device dictates how the drawing window will appear. In *MacDraw*, for instance, you set the drawing size by selecting the number of print pages on which the drawing will be printed, which in turn is dependent on what printer you've selected. With *VersaCad* this is not the case. What portion of your drawing *VersaCad* plots or prints and at what scale it

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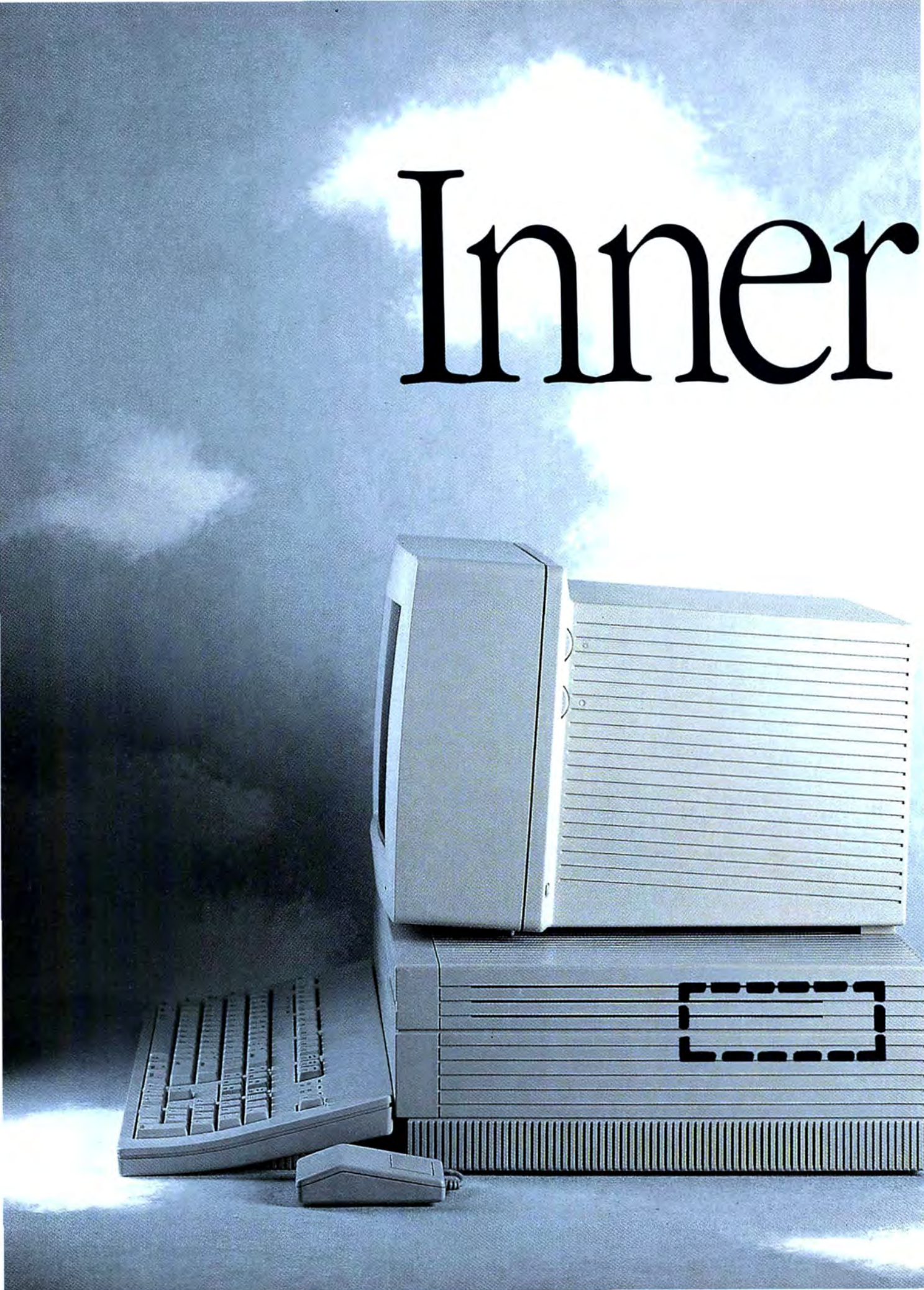
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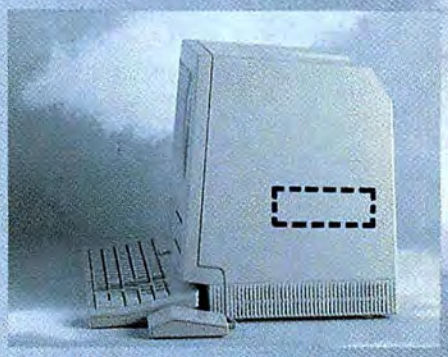
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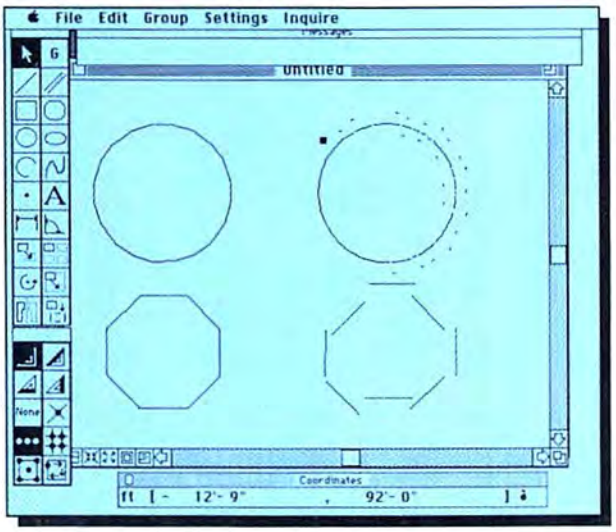
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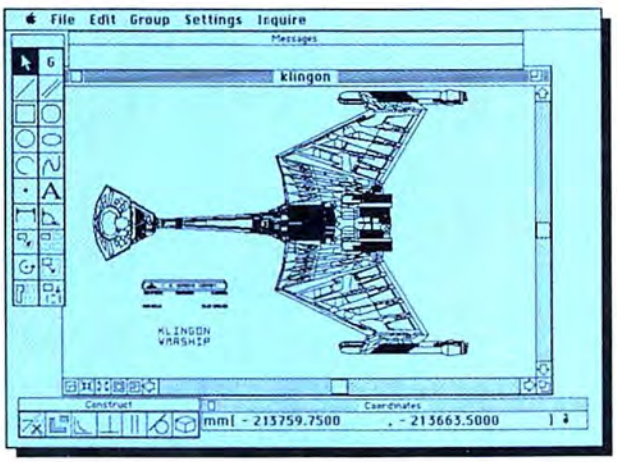
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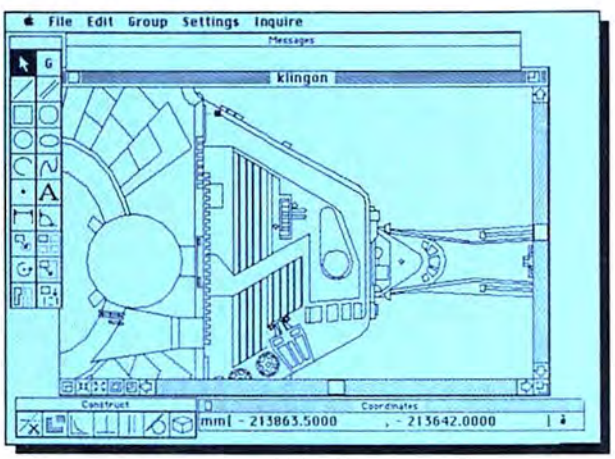
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Examples of objects "exploded" using the EXPLODE Command. Note how circles are converted into tiny line segments, the polygon fairing better as 8 line segments.



This is an example of a drawing that was translated from a mainframe system, in this case an Intergraph system, to *VersaCad* using *VersaLink*, *VersaCad*'s excellent data-translation software.



This is a much closer view of the converted file, showing the amount of detail *VersaCad* is capable of supporting.

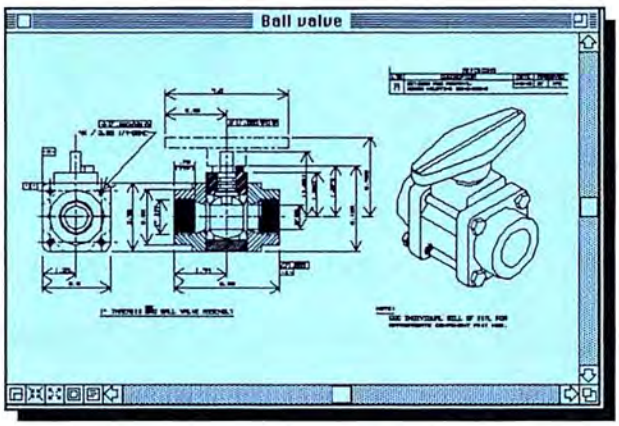
prints is determined by you at print time. The Window In/Out icons "zoom" the drawing window so you can work in close for detail work or further out for the big picture. Each time you zoom, the program recalculates the precise position of all the drawing objects so that you get an accurate representation of the drawing at any magnification. The Sketch icon redraws the screen.

THE CAD DIFFERENCE

Most of the functions I've described up to now could belong to an advanced version of *MacDraw*. This discussion has only scratched the surface, however. *VersaCad* relies heavily on the use of windows, or palettes. In fact, when you first start the program, it displays only half the available windows. This allows you to display only the commands you need at any given time — an important consideration when dealing with the limited display area of a Mac Plus or SE. You select other command palettes from the Settings menu; these include Constraints, Construct, Symbols, and Hatch windows. Along with other functions in the default windows, these windows give you all the features of most CAD systems.

The Constraints palette controls how the objects are placed into the drawing. The only function familiar to *MacDraw* users is GRID SNAP. The other constraints include INTERSECTION SNAP, X-LOCK, Y-LOCK, OBJECT SNAP, and EQUATION SNAP. These constraints control how the object is inserted, and they form a powerful coalition with the Input Mode window (from the Settings menu) for accurately placing and modifying objects in the drawing. The OBJECT SNAP and EQUATION SNAP functions let you place or modify elements with respect to objects already inserted into the drawing — for instance, you can insert a line that starts on the edge of a circle by selecting EQUATION SNAP and terminate that line on the same circle (or

Most of the functions I've described up to now could belong to an advanced version of *MacDraw*. This discussion has only scratched the surface, however.



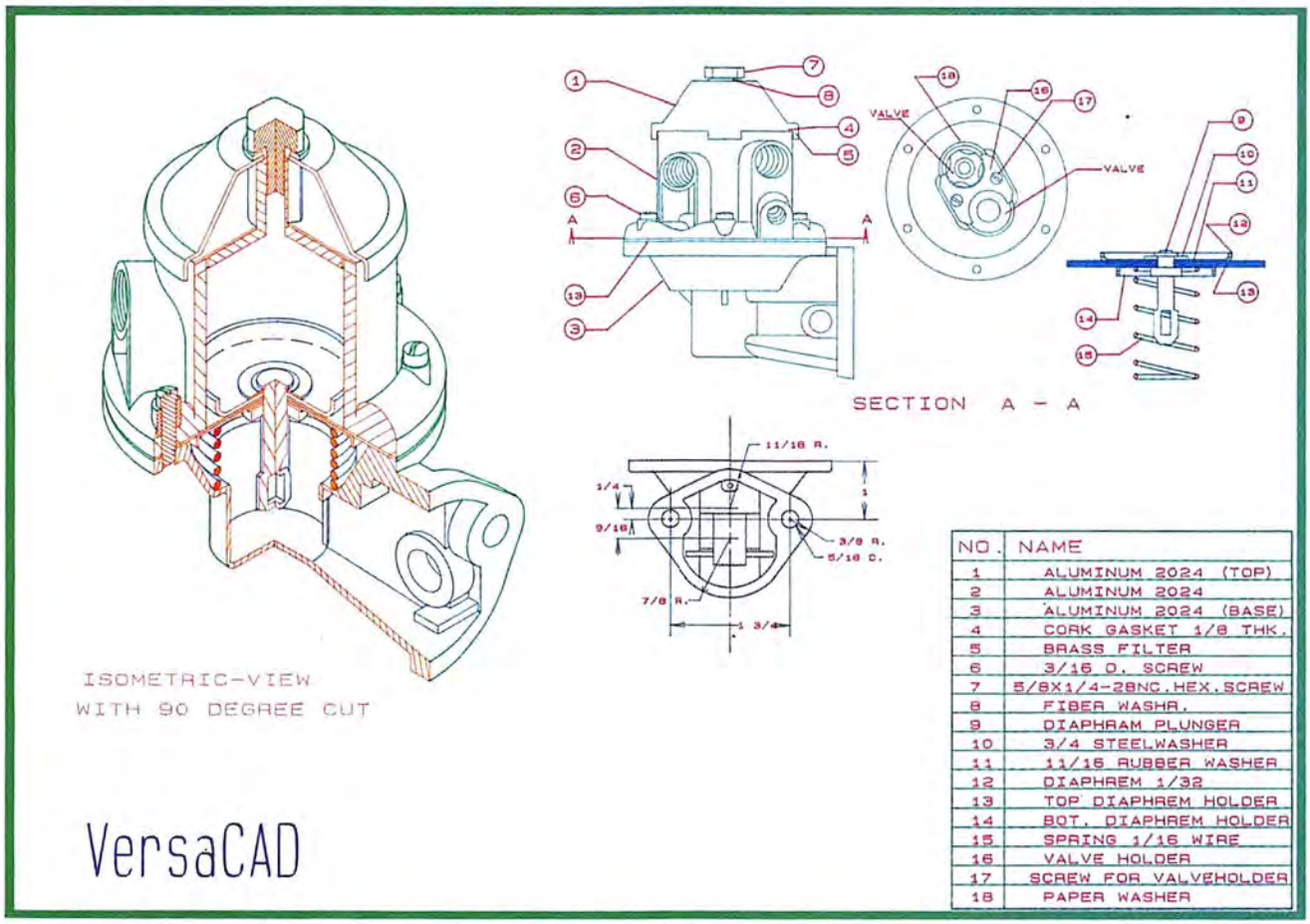
VersaCad **gives you complete control over plots and prints with its window icons located in the horizontal scroll bar. With these, you can determine maximum "drawing" area, "zooming," "window in," "window out," "window full," and "sketch."**

on any other object) by using EQUATION SNAP again.

Often when creating a drawing, you need to enter precise coordinate information. To do this you call the Input Mode window from the Settings menu. This window includes the options ABSOLUTE, RELATIVE, and POLAR. Selecting ABSOLUTE allows you to type in the x,y coordinates for placing your object. RELATIVE and POLAR use the coordinate data of the last coordinates entered — either the end of the last line inserted or the "handle" of the currently selected object. Choosing RELATIVE means the x,y-coordinate information is entered; with POLAR the angle and distance data is entered.

Switching back and forth between the different modes takes some getting used to, but to help you keep track of coordinate data, the Coordinates window always gives you the location of the cursor with respect to the lower left-hand corner of the drawing. Other options are available by clicking on the button in the Coordinates window.

Yet one more command palette is the Construct palette, which contains seven of the most powerful geometric-construction techniques commonly used in CAD — EXTEND/TRIM, OBJ. BREAK, FILLET, PERPENDICULAR, PARALLEL, TANGENT, and ISOMETRIC. This one palette encompasses 75% of computer-aided design. You use the EXTEND/TRIM command to trim two lines to their intersection point, a time-consuming and inaccurate function under *MacDraw*. The OBJ. BREAK command lets you remove a portion of an object or objects. As with most



With the Plot Setup command in *VersaCad*, you can select not only what gets plotted but also how it will be set up on paper. The dialog box shows you a miniature view of the active drawing and a picture of the paper. You select by dragging this box over the portion of the drawing you wish to plot.

An UnCADdy Resemblance

VersaCad Corporation has dropped a real BOM (Bill of Materials) shell on the CAD market with its "new and improved" *VersaCad* 1.1. Although the new version doesn't slice, dice, or brew the morning coffee, it does enable architects to generate cost analysis reports and presentations.

The new *BOM* program is available on a separate disk, to be used with *HyperCard*. *BOM* generates an itemized cost analysis report. You define your own categories for the report (e.g., unit cost, wages). And, if you have a serious aversion to the existing formulas, you can define your own. When you design on *VersaCad*, costs attached to all drawing symbols, such as doors and screws, are totalled. In the end, you have a report in a user-specified format that you can export to a word processor or spreadsheet.

Other new features of the *VersaCad* program include the use of Encapsulated PostScript Format (EPSF), which allows you to transfer work from *VersaCad* to programs like *PageMaker* and *Word* without losing any of the resolution or quality of your drawings.

Architects can even cheat with the "rubberband group" stretch feature. (No, this is not an exercise video.) It's a time-saving device that lets the architect enlarge a room to fit his or her designs while maintaining overall proportions. The new version also has a complete symbol library, including bathtubs and doors.

Users of the 1.0 version will receive a free upgrade. Those of you who sent in your warranty cards are on-line with VersaCad Corporation and will receive version 1.1 automatically. Other users will have to call VersaCad for the upgrade. (*VersaCad* 1.1 is available to new users for $1995) For more information on the program, contact VersaCad Corporation at 2124 Main Street, Huntington Beach, CA 92648; (714) 960-7720.

— *Kristi Coale*

commands in this program, OBJ. BREAK has a rich set of options when double-clicked. The ability to construct fillets is another important CAD function, and the added ability to construct these fillets between lines, arcs, and circles is a nice addition. PERPENDICULAR, PARALLEL, and TANGENT construct lines as their names imply, and you use the ISOMETRIC command to generate isometric renderings of a selection of elements.

LIBRARIES, GROUPS, AND LEVELS

I said at the start that *VersaCad* is a general-purpose CAD program designed to be all things to all people. To this end, *VersaCad* addresses a major area that people such as electrical designers, process-plant engineers, and architects need. Each of these disciplines involves a large degree of repetitious data that is used throughout the drawing. For electronics this would be the different electrical-component symbols; for architects it would be items such as doors and windows. Having to draw these symbols — or even duplicate them — time and time again is tedious at best.

VersaCad has implemented a symbol-library feature that allows you to store and recall frequently used symbols. To use this feature, you need to create a library using the NEW LIBRARY command under the File menu. This library can have room for up to 1000 symbols. Be careful when selecting the number of symbols to be stored; there is no way to increase the size of the library once you've created it — an oversight on the part of the designers. Once created or opened, the library is displayed as a named window with numbered boxes, each box representing a symbol. A double-click on a box brings up a dialog box used to maintain the data in the symbol. To insert your symbol into the appropriate box, select the Add button. *VersaCad* will prompt you for the name of the drawing file whose contents you want inserted into the symbol. Other options include editing certain aspects of the symbol's appearance and the "handle" by which the symbol is inserted.

VersaCad has implemented a symbol-library feature that allows you to store and recall frequently used symbols.

To use the symbol in your drawing, select the appropriate symbol and click to place it. This method of symbol control is somewhat primitive and awkward to use. Once you've created a symbol, the only way to know what is in it is to select and insert it or use a utility command to print out a "map" of all the symbols on your printer. VersaCad is considering other options for future versions of the program, but at press time it had not decided on an alternative.

Another method for manipulating several objects at once is to use the GROUP command. Creating a group brings several elements together under one name with a common point or handle with which to manipulate it. Once you've created a group, you can move, copy, and even file it under a separate file name. Unlike using the GROUP command in *MacDraw*, indi-

On to Another Dimension!

Just as we went to press, VersaCad Corporation announced its plans for a 3-D CAD program that should be out by the time you read this. What Sensurround did for movies like "Roller Coaster," *VersaCad* in 3-D will do for design engineering. (Special glasses not included.)

Using *HOOPS 3D* graphics technology from Ithaca Software, *VersaCad*'s 3-D program will feature automatic extrusion, circular sweeping, color shading, and wire frame.

— *Kristi Coale*

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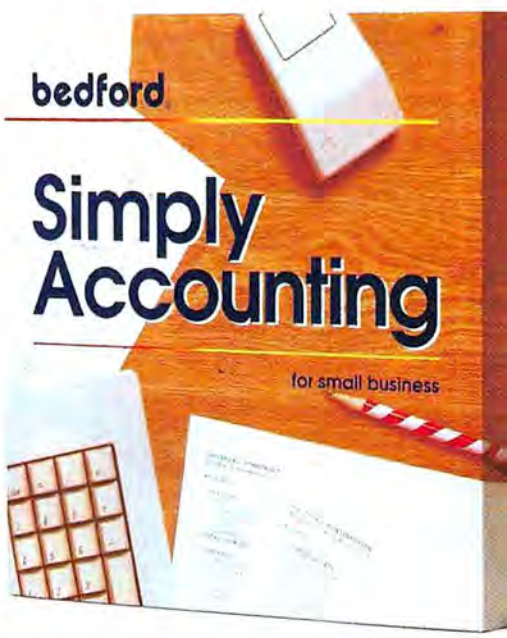
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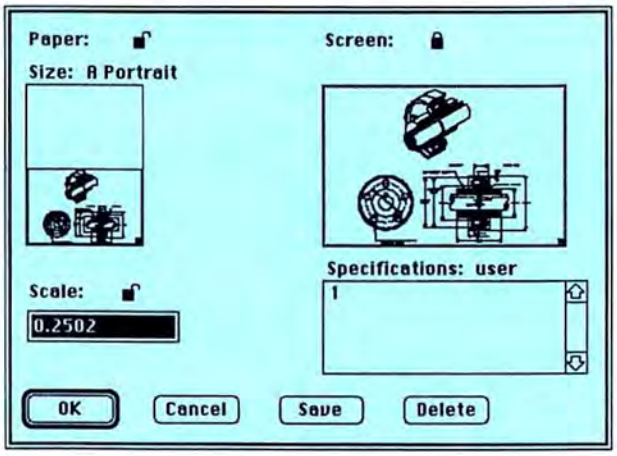
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This is *VersaCad*'s Plotter Setup dialog window. Note the "lock" icons signifying that the two modifiable parts of the dialog are Scale and Paper. Clicking on one of the open locks will lock it and unlock the previously locked window.

vidual objects can still be manipulated while remaining in the group.

Another common method for collecting related objects is to use level separation. Levels are analogous to overlay drafting, in which different parts of a drawing are drawn on different sheets of mylar. The final drawing is created by combining the appropriate overlays. A typical level scheme would combine all walls on one level, doors on another, and dimensions on yet another. *VersaCad* supports up to 250 levels and can selectively display and plot all levels. You place objects on a given level by setting their level properties before insertion or by using the EDIT PROPERTIES command.

PLOTTING THE RESULTS

When the drawing is complete, the final step is plotting it out. For this *VersaCad* has an excellent interface that supports almost all major plotters, including the whole H-P and Houston Instruments lines.

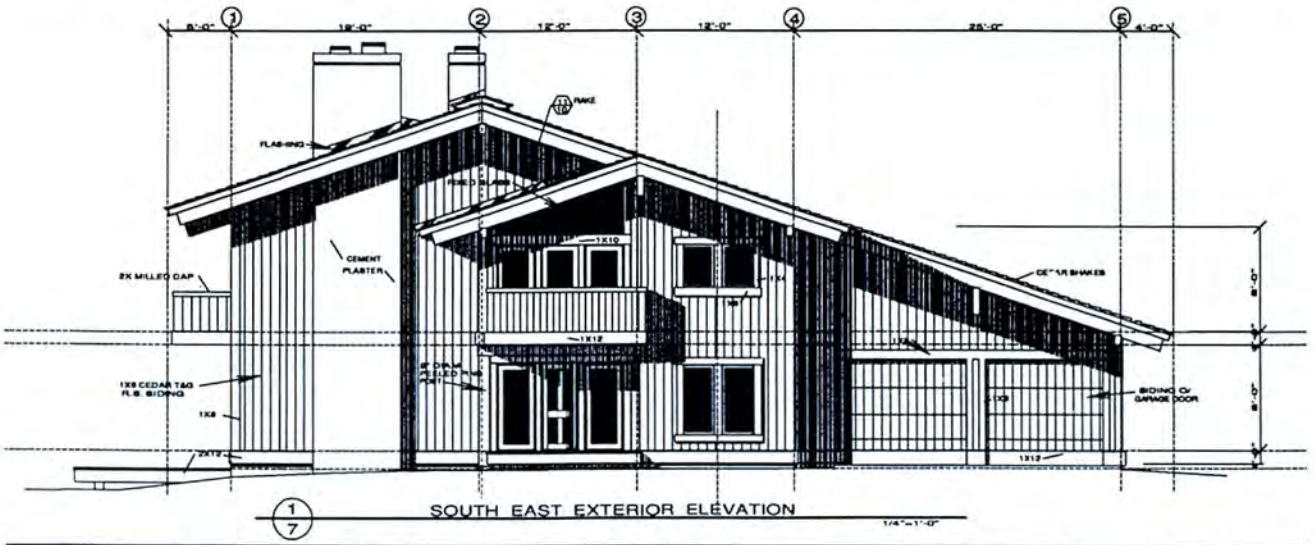
The program uses a clever technique of setting up the plotter output. Instead of the usual terse "Enter the size of the drawing" or "Select scale" message, *VersaCad* allows you to choose not only what gets plotted but also how it will be placed on the paper. You do this with the PLOT SETUP command. You can set what is to be plotted by dragging a box over the portion of the drawing you wish to plot. You can enter a set scale, and the results of the scale change show up in the paper view, which means you can tailor your final output in a Preview mode just prior to plotting. You can also save plotter setups for future plotting.

V*ersaCad* has worked hard to make the program bug free. In its rush to get the program out on time, however, a few idiosyncracies have crept in.

Another nice feature is *VersaCad*'s ability to "ask" the plotter what size paper is being used. This option, of course, depends on the plotter's ability to respond. Overall, the final output is excellent and a very easy part of the job.

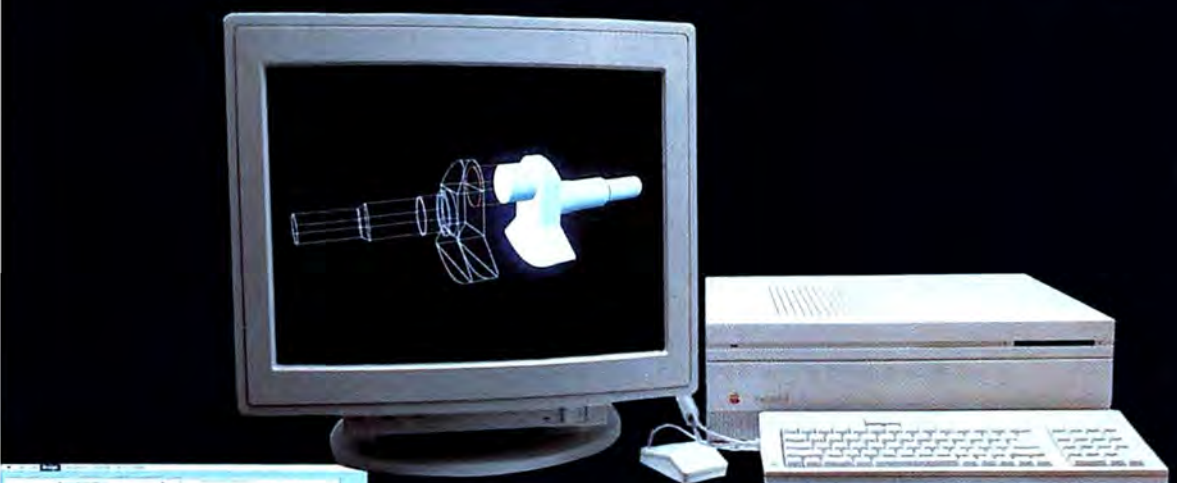
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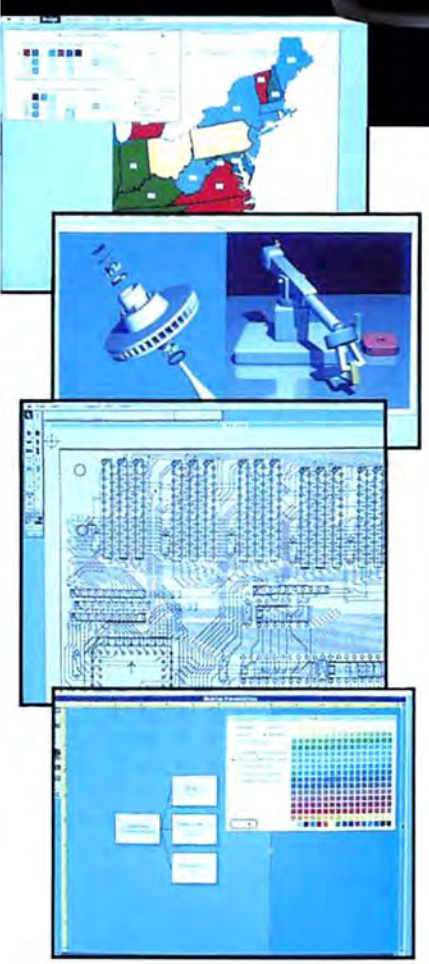
In the area of customer support, VersaCad has put forth an admirable effort. Its 800 number puts you in



VersaCad allows you to tailor your final output in a "preview" mode just prior to printing. Plotter setups can be stored using the save button, allowing you to retrieve them for later modification or printing.

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touch with a technical-support staff who seem to be able to answer most questions. The only problem I had was that all the Macintosh IIs in the tech-support area had been moved temporarily to the training department.

The documentation comes with a fairly complete manual that includes a good set of tutorials for first-time CAD users. Combine this with a *HyperCard* stack for additional help, and it's pretty tough to beat!

TO MAKE GOOD BETTER

VersaCad has worked hard to make the program bug-free. In its rush to get this version out on time, however, a few idiosyncracies have crept in. Under *MultiFinder* the program has a habit of exiting for no apparent reason, requiring a reboot to correct the situation. There's also the comparatively primitive handling of the symbol libraries. The only other "glitch" I encountered was a tendency on the program's part not to unhighlight deselected objects — a problem that's easy to correct by redrawing the screen.

As good as this program is, there are some features that would make it better. First would be to speed up certain functions. When an object is highlighted in the blink mode (such as when constructing a tangent), the system slows to a crawl, even on the Mac II. This needs to be corrected as it can be really annoying to click on a dialog button and have to wait what seems an inordinate amount of time. Maybe a better highlighting technique should be used, such as "dotting" or "dashing" the selected object.

In all, *VersaCad, the Macintosh Edition* is an excellent piece of work with all the features professional users need while maintaining the intuitive feel of the best Macintosh programs. For a transfer from the MS-DOS world, there can hardly be higher praise.

FRANK CONFORTI IS THE BRANCH MANAGER FOR A COMPUTER-AIDED-DESIGN SERVICE BUREAU IN FORT LAUDERDALE, FLORIDA AND IS CURRENTLY CO-AUTHORING A BOOK ABOUT CAD ON THE MACINTOSH. HE HAS BEEN INVOLVED IN CAD SINCE THE EARLY '70'S.

MACUSER RATING

VersaCad ¢¢¢¢

Follows Mac Interface	■ ■ ■ ■ □
Printed Documentation	■ ■ ■ ◧ □
On-Screen Help	■ ■ ■ □ □
Performance	■ ■ ■ ■ □
Support	■ ■ ■ ■ ◧
Consumer Value	■ ■ ■ □ □

Comments: An example of a well-thought-out IBM-to-Mac program conversion. *VersaCad* shows none of its MS-DOS roots. **Best Features:** Excellent element manipulation; full plotter support. **Worst Feature:** A crude library user interface. **List Price:** $1995. Published by VersaCad Corporation, 2124 Main Street, Huntington Beach, CA 92648; (714) 960-7720. Requires Mac Plus.

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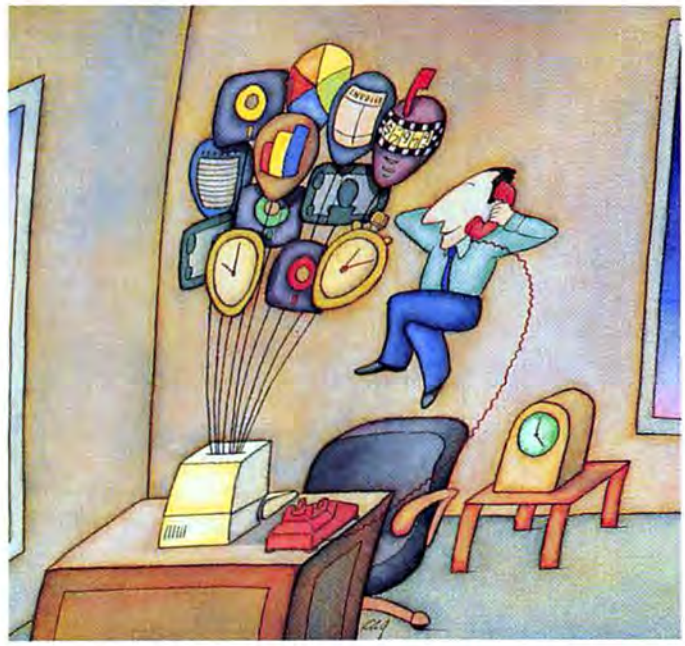
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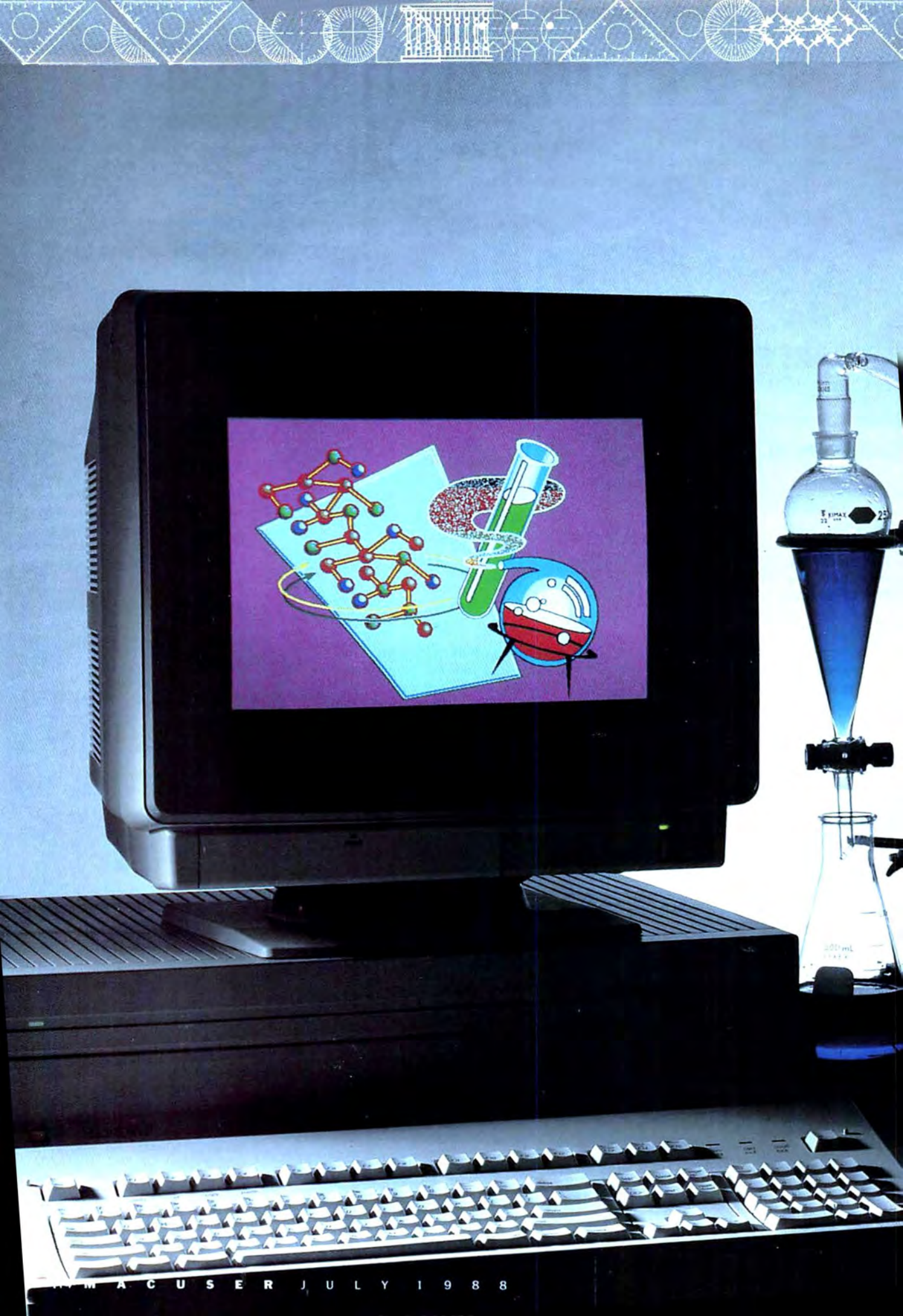
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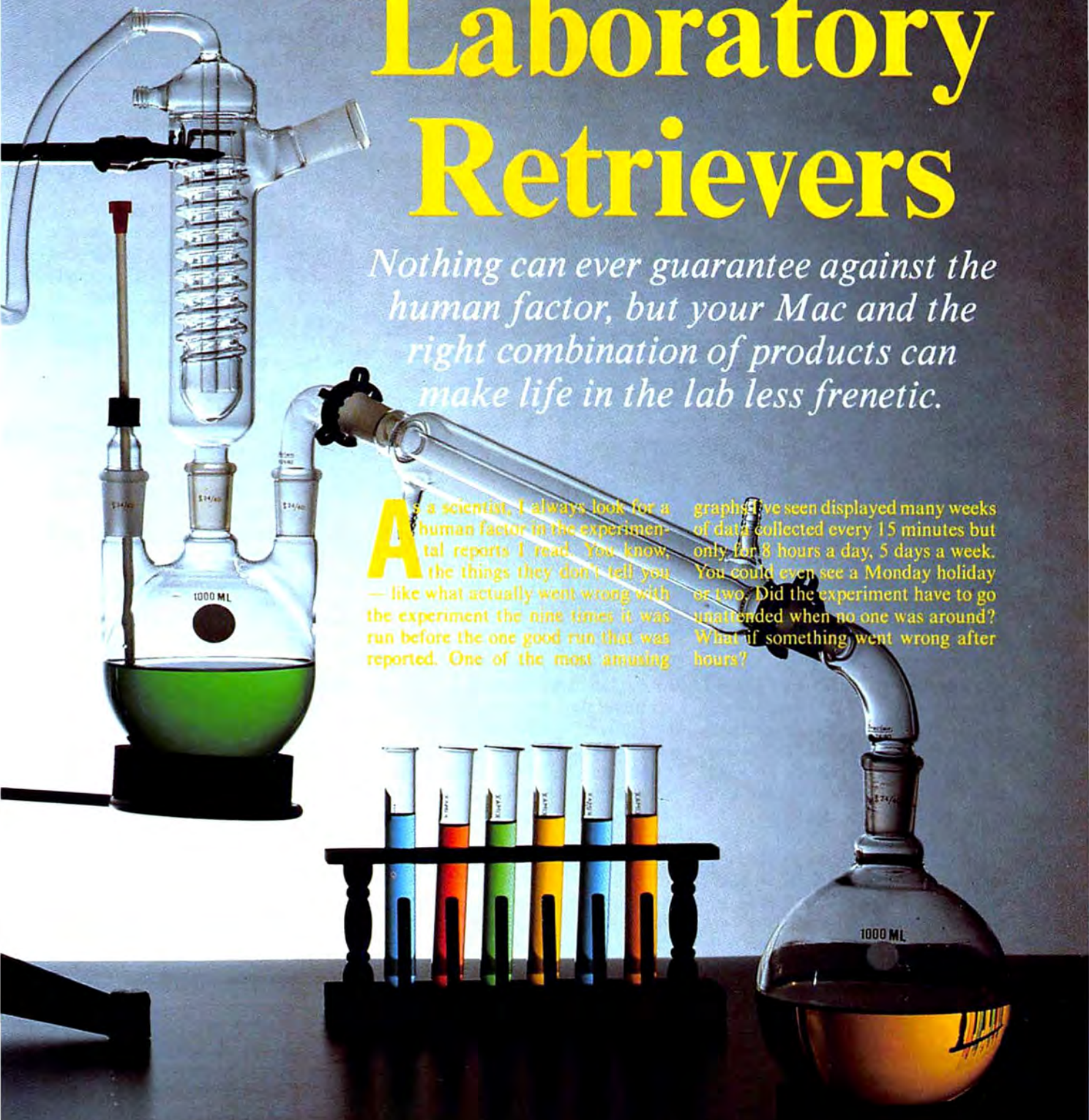
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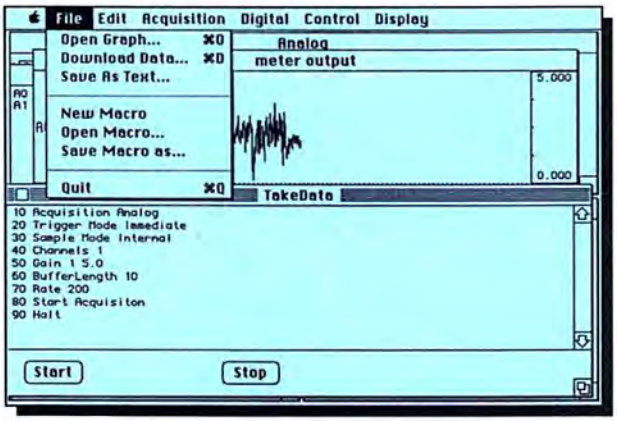
Nothing can ever guarantee against the human factor, but your Mac and the right combination of products can make life in the lab less frenetic.



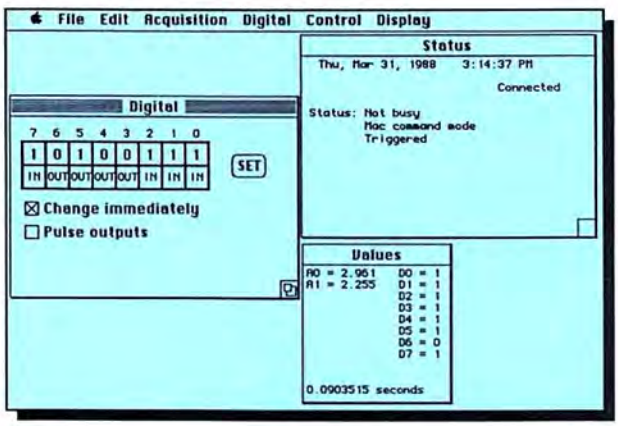
As a scientist, I always look for a human factor in the experimental reports I read. You know, the things they don't tell you — like what actually went wrong with the experiment the nine times it was run before the one good run that was reported. One of the most amusing graphs I've seen displayed many weeks of data collected every 15 minutes but only for 8 hours a day, 5 days a week. You could even see a Monday holiday or two. Did the experiment have to go unattended when no one was around? What if something went wrong after hours?

BY LINDA CUSTER

WALTER JEBE II



PacqManager includes a macro editor. The MacPacq hardware receives the macro and executes it on demand.



You can monitor values of all MacPacq lines and set all digital lines instantly using *PacqManager*.

With the right add-ons, the Macintosh can replace error-prone lab assistants who scribble readings into notebooks. By monitoring experiments around the clock, tests are more empirically correct, and there's the added benefit of having the data in the computer, ready for analysis.

I looked at three data-acquisition systems: MacPacq with *PacqManager* software, the MacADIOS II board with optional *MacADIOS II Manager* software, and *LabView* instrument programming and simulation software. To use any of these systems, your experimental apparatus must be controlled or monitored by analog or digital voltage signals with magnitudes of less than 5 or 10 volts — most can, though some conditioning might be necessary.

PACQ IT UP

If you use a modem or have transferred data over a computer network, you already understand a lot about how MacPacq and *PacqManager* software work. MacPacq is a peripheral device, capable of monitoring and controlling lab instruments on its own. It communicates with the Macintosh only to receive instructions and send back the data it has acquired. Because it's powered by 12-volt batteries, you can leave it on its own while using the disconnected Macintosh for other things.

MacPacq is simple to set up. All the hardware you need is in one box. A cable connects MacPacq to the modem or printer port of your Macintosh. Attach the terminal board to MacPacq and to the instrument signal lines. To activate the hardware, you just enter the *PacqManager* software and choose CONNECT from the Control menu. Open up the Realtime window and start taking data. Immediately after hitting the Start button, you'll see a graph of voltages on all selected channels generated on the screen.

Eight channels are available for analog inputs, although all are referenced to a common line. Eight digital samples are also available for input or output. The sampling rate you choose applies to all channels; however, you set the gain for each analog channel separately. Pulse counting from one digital channel is available as well. MacPacq samples until it fills the buffer size, which you allocate in increments of 256 bytes up to the internal ceiling of 64K.

So far, though, *PacqManager* only displays a graph. There's not even a print utility in this phase of the program. You have to press Command-Shift-3 to generate a *MacPaint* screen image and then print the graph. To save the data for analysis or plotting in another program, choose DOWNLOAD DATA from the File menu and name a new file. (This file will be readable only by *PacqManager*.) If you then choose SAVE AS TEXT, the file can be read and plotted by *Excel*, *Cricket Graph*, and almost any other spreadsheet or statistics program. You can scale the values in a file between 0 and 255, or you can use the actual voltage levels. You can examine the exact value of any point on the graph just by pointing to it. You'll probably want to do most data analysis outside *PacqManager* because its functions are limited.

To use MacPacq unattended, you need to investigate its remote mode. Using a simple macro language of 22 commands, you can program any sequence of steps you desire. It comes with a simple text editor for writing macros, or you can use your favorite word-processing program. When you're satisfied, transfer the macro to MacPacq by clicking Start. Now you can disconnect the Mac and run the macro as often as you wish by pressing MacPacq's Reset button.

Even with this additional flexibility, you might find problems you can't solve. Don't despair. Get a copy of *Turbo Pascal* and use *PacqManager*'s special interface library to write your own application. It's easier than you might think, even if you hardly know Pascal. Your program just needs to call the commands and maybe use a few read and write statements. The only drawback to this solution is that you lose MacPacq's remote capability — it takes some snazzy programming

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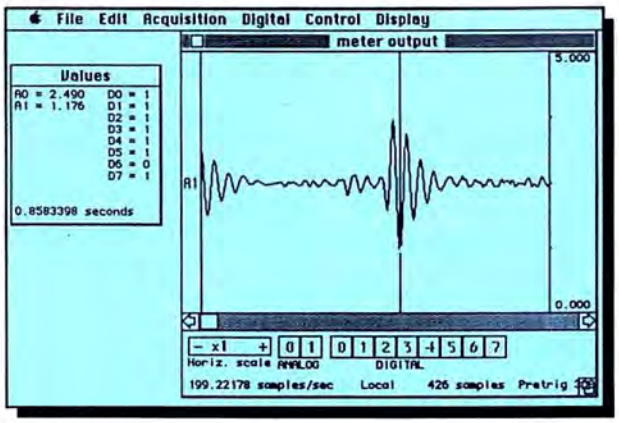
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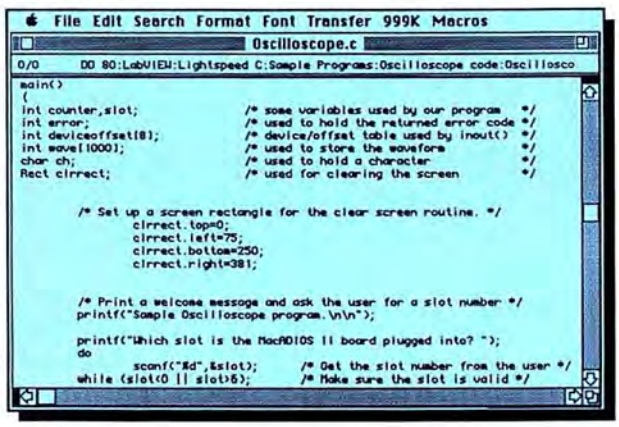
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PacqManager graphs downloaded data and can report the time and voltage values anywhere you position the cursor.



Both MacADIOS and *PacqManager* come with their own well-documented interface libraries that allow you to use your favorite C, Basic, Fortran, or Pascal Compiler to customize data acquisition.

to run your program in the background while you use your Mac for other things.

ADIOS, AMIGOS

Another possible path to your data needs is the MacADIOS II board. It's available for direct installation in a Mac II or as a card and expansion chassis for the Mac SE. (GW Instruments also sells a system — the 411 — for other Macs; call the company for details.) Thanks to the expandability that comes with available built-in daughterboards and the compatibility that comes with NuBus or SE Bus integration, MacADIOS II turns your Mac into a first-rate lab assistant. Instead of storing data and downloading it over serial lines, MacADIOS II puts data directly into the Mac's memory for any program to get as quickly as it wants. Although the expansion chassis allows the Mac SE to perform all available functions, in some cases the maximum sampling rate is reduced by about 50 percent because of the SE's smaller bus width.

Another possible path to your data needs is the MacADIOS II board. It's available for direct installation in a Mac II or as a card and expansion chassis for the Mac SE.

Installation in the Mac II is simple: plug the card into a NuBus slot and attach both the card and your signal lines to a terminal board. If you're connecting up to a Mac SE, more work is required. Usually the MacADIOS II card will already be installed in its expansion box. But the SE doesn't have NuBus, so you, or preferably a qualified Mac technician, need to open up the Mac SE, install an expansion card that provides the circuitry to allow the SE to communicate with the external Mac II NuBus card, and then connect the expansion box with card to the SE card. The SE card doesn't provide connectors for piggybacking other SE cards. If you've installed a third-party hard disk, memory expansion, accelerator, monitor card, or other hardware, check first to be sure the card will fit.

In its base configuration, MacADIOS II comes ready to read up to sixteen analog channels and to control two. It also reads eight digital channels and controls eight separate digital channels. Jumpers on the main board let you select whether data will be gathered around zero voltage or whether only positive voltages will be sensed. Using only positive voltages doubles the effective resolution. Jumpers also govern whether data is taken in binary or two's complement mode. Gain settings govern signal range and can be set from 10-volt full scale (unipolar or bipolar) down to 100 mV. At 100 mV full scale, resolution of 48.8 μV is possible.

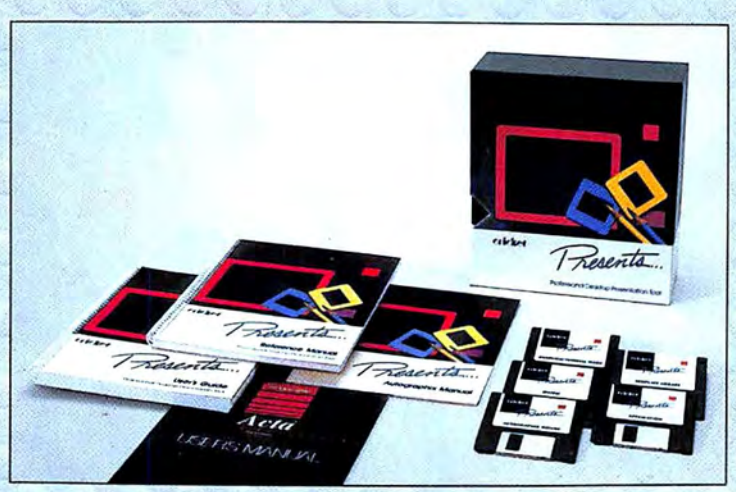
But wait — there's more. Look for another three independent 16-bit I/O channels for pulse counting and the like and another 4-bit programmable frequency-output channel. If that's not enough, three empty sockets can be filled with daughterboards of your choice. You can make your own (on an optional prototype daughterboard with some instructions included) or buy them preassembled. Available daughterboards can provide additional analog inputs (32 single-ended at a time), antialiasing filtration, additional digital I/O channels (one 16-bit input and one 16-bit output at a time), or additional A/D conversion power at up to 833 kHz. You can mix and match to the configuration you need.

All daughterboards extend into their neighboring NuBus slot. With just one daughterboard in the right slot, you can fit a short card in the next slot. With all daughterboard slots filled, however, the next slot is com-

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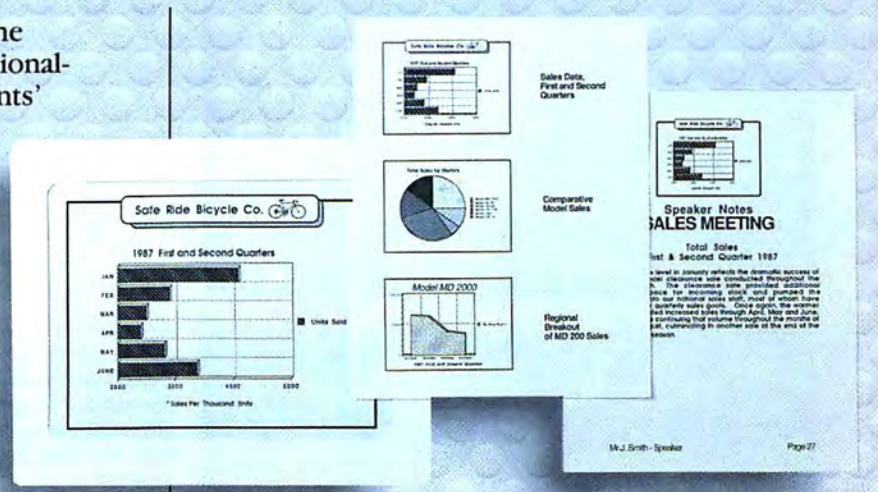
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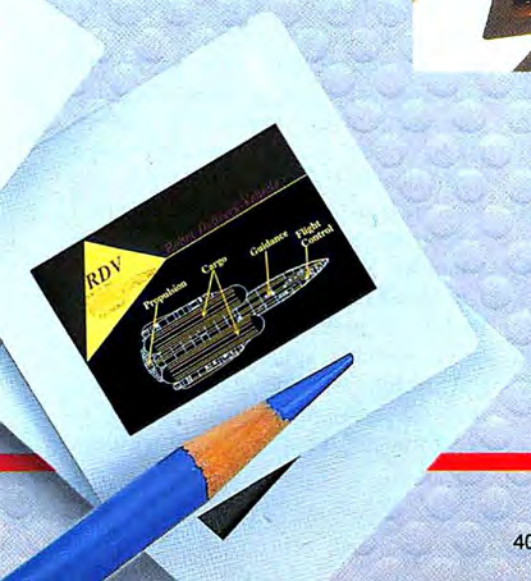


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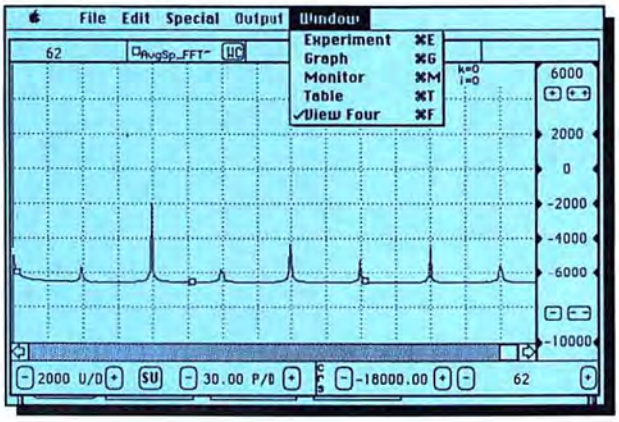
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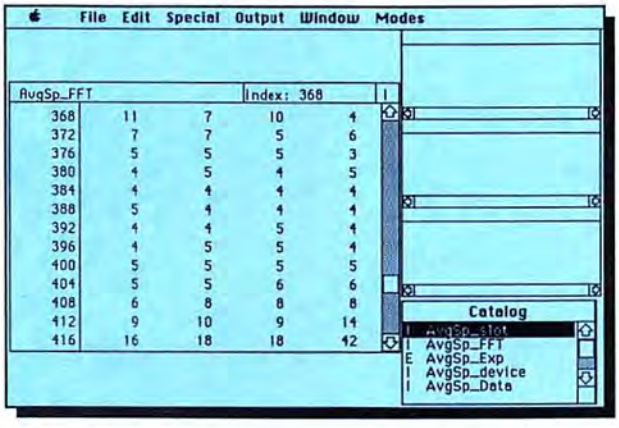
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MacADIOS II Manager **plots acquired waveforms on a graph with user-selectable scales and axis ranges.**



You can display and save digital tables of data with *MacADIOS II Manager*. The tables can be read by *Excel* and many other programs.

pletely blocked. If you're buying a Mac II and want to load it up with cards, plan ahead.

SOFTEN UP

Once you've chosen the MacADIOS II hardware configuration that's right for your application, you need to choose the software to make it all go. (None is included.) You have four choices. You can use *MacADIOS II Software* routines to write your own programs with almost any development system. (Apple's MPW languages and *Turbo Pascal* aren't supported.) Or maybe use Structural Management Systems' *Parameter Manager Plus* with the *pmMacADIOS* add-on to *pmTalk*. If that's not suitable, and you need to use MacADIOS right out of the box, try *MacADIOS Manager II*. Or put together routines in *LabView*. Whatever you do, spend some time reviewing the options as carefully as you do all your major software choices. None of the software options are particularly cheap, and you probably won't need more than one of them to get the job done.

Purchasing the *MacADIOS II Software* package provides you with a library of 13 I/O routines and 33 data-manipulation routines you can call from *Microsoft BASIC*, *MANX Aztec C*, *Consulair Mac C*, *Lightspeed C*, *Lightspeed Pascal*, or *MACTRAN77*. The data-manipulation library includes all the routines necessary to save and load data as well as to convolve, integrate, differentiate, fast Fourier transform (FFT), inverse FFT, scale arrays, and much more. Each routine is well documented in the accompanying manual. As with the *PacqManager* routines, you don't need a thorough grounding in a language to write a useful application. It may not be pretty, but it will get the job done.

With *Parameter Manager* you use *pmMacADIOS* to make the 13 I/O routines of the software library available in the *pmTalk* data-acquisition and -control menu. It also adds a few special commands of its own for moving data around inside *Parameter Manager*. You construct a program, which is similar to using *MS-BASIC*, and execute it from *Parameter Manager*. You can then make use of *Parameter Manager*'s graphics, analysis, and export capabilities directly. If you're thinking about buying *Parameter Manager* anyway for other lab applications, this is probably the best plan to pursue.

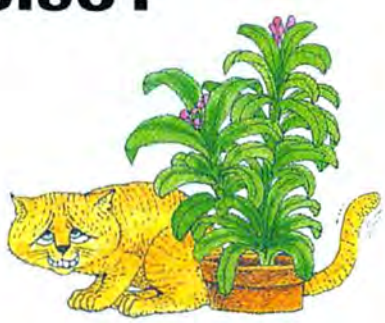
The program specifically designed for MacADIOS II is *MacADIOS II Manager*. It provides a relatively simple but complete way to send, receive, view, and manipulate data. Data is stored in waveforms, linear arrangements of integers, or floating-point numbers, and it's gathered by running BASIC-like programs called Experiments.

Similar to *PacqManager*'s macros, Experiments are specified inside a strict structure of two nested For loops. The inner For loop executes with a given value of the variable `index` and the outer loop with a value for the variable `cycle`. Data from MacADIOS II is available through predefined constants — for example, `aout1` is the value of analog I/O channel 1. Getting data is as easy as defining a wave (call it `mywave`) and then giving your Experiment commands such as `let mywave[index] = aout1`. Most of the functions available in the *MacADIOS II Software* package are also available within Experiments.

Once you've run an Experiment and filled waveforms with data, you can view them in the Graphics window. Horizontal and vertical scales are adjustable, and a multiplier and offset can be applied to each point if desired. You can even use the mouse to draw a new waveform over existing points. Different windows monitor the decimal value of any channel at any instant, or you can view waveforms in a numerical table if desired. You can even view up to four waveforms plotted on top of each other in the ViewFour window. With a simple command from the Special menu, you can immediately smooth, transform, convolve, or get statistics on any waveform.

Printing is supported for waveforms and Experiment listings. All other windows can be printed only with the

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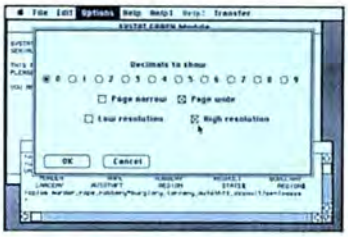
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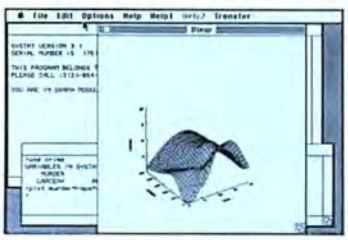
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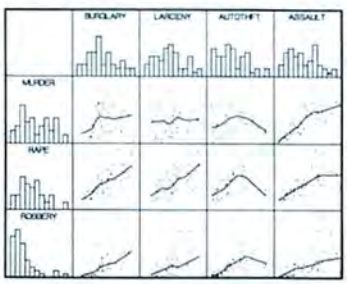
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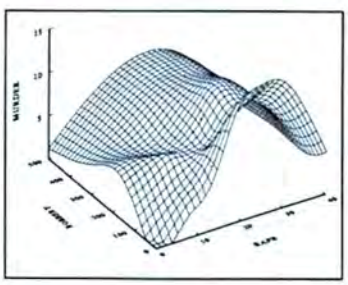
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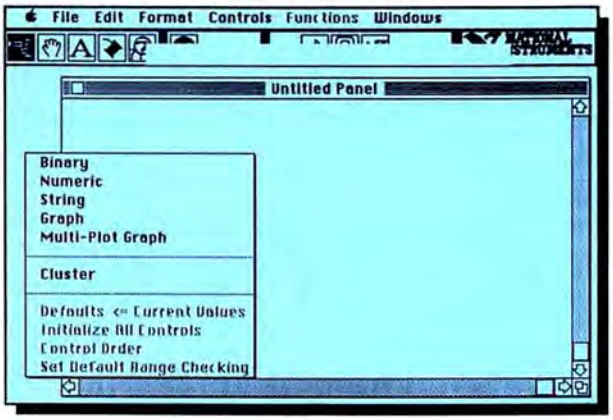


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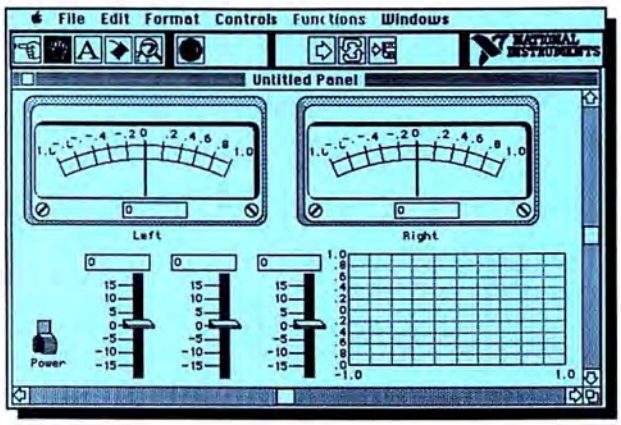
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LabView sports a smooth interface with pop-up menus. To place a new object, hold down the command key and click anywhere in the window. Then select the object you want.



Assembling the pieces needed to create a clear, readable user interface is simple in *LabView*.

standard screen dump FKEYs. You can store waveforms on disk and can save them in BASIC or *Excel* formats. You can save whole configurations so you can quit and later get back rapidly to where you were in the program.

VIRTUALLY COMPLETE

The final option for software to use with MacADIOS II is *LabView*. It's the closest thing to the revered *Asyst* package available for IBM PCs and clones. *LabView* does an admirable job of running the MacADIOS II board, but it's also a significant program in its own right. It's a complete graphics-based programming environment that is more powerful for some applications than BASIC, C, or FORTRAN. It can manage both Mac serial ports and can control instruments over GPIB — an acknowledged standard interface found on many scientific instruments. It can also solve mathematical problems, especially those involving large matrices, and contains tools to make short work of simulations and "dry-lab" experiments.

The central principle and most important operating unit of *LabView* is the virtual instrument — a software construction of parts connected in a flow diagram. These instruments do everything: They control parameters; send, receive, and display information; and appear to the user as a physical control panel. They're controlled by the underlying wiring diagram. *LabView* programmers create front panels from available parts (or create brand new parts) and then "wire" the component leads together to achieve the desired results in a fraction of the time it would take to create input files, run programs, and talk to a cryptic command-line interface.

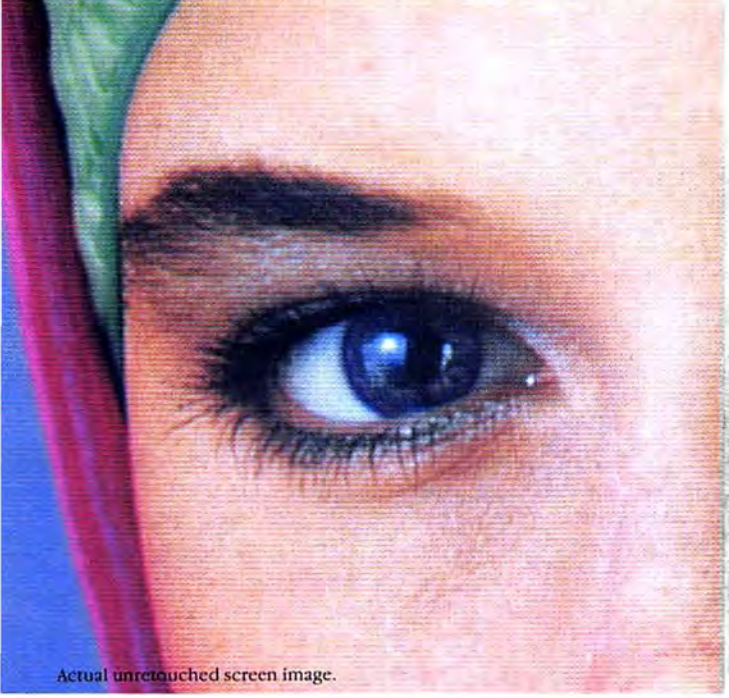
With the wiring done and the control panel designed, the illusion is complete. On/off buttons look like real on/off buttons. Volume dials and slide levers work the way they do on the car dashboards and stereos you're used to. Digital readouts and analog-style meters are used interchangeably, depending on which seems more natural. The graphics interface can be so well-designed, in fact, that most of the time instruments require little documentation. After all, everybody knows how to turn dials and flip switches.

G WHIZ!

All of this works because of a graphical programming language called G built into *LabView*. G is easy to learn and use. Open a window for a new instrument through the File menu. Then hold down the Command key and press the mouse. Immediately, a pop-up menu materializes and you choose what kind of piece goes there: binary, numeric, string, or graph object types. But *LabView* has more than just one kind of each control type. You can Command-click directly on a control you've created and get a pop-up menu full of suggested styles. You can choose a sliding numeric control or a digital one. Pick a square on/off switch or a round one. And on and on.

Objects don't do anything until they're wired up. The next step is to switch windows and look at the block diagram of your instrument. Each control is visible, but it's smaller and can be moved independently of its position in the front-panel window. Because each control represents an input or an output of some process, controls are wired as parameters to icons representing functions or instruments. Command-clicking here pops up a menu of choices. *LabView* contains icons for numerous functions, including arithmetic (such as addition), comparative and timing (such as less than or wait until), transcendental (such as sines and logarithms), input/output (such as writing to a file or sending information over the Mac's bus), and array and string operators (such as invert an array). You can also build your own functions as small instruments (subroutines) and include them as part of a future instrument.

Flow-control icons give G a special flavor. Put a repetitive (While) loop, a select (Case or Switch) structure, an iterative (For) loop, or a sequence (Ordering) structure where you need it and make it large. Then just toss in the program steps that come within the loop and connect them. Any parameters the loop requires (such as the con-



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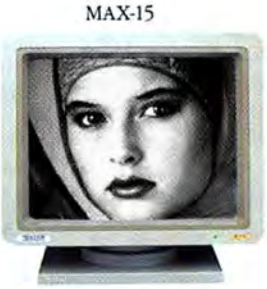


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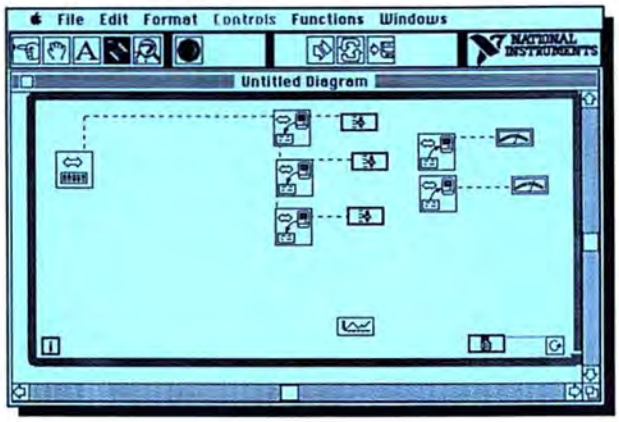
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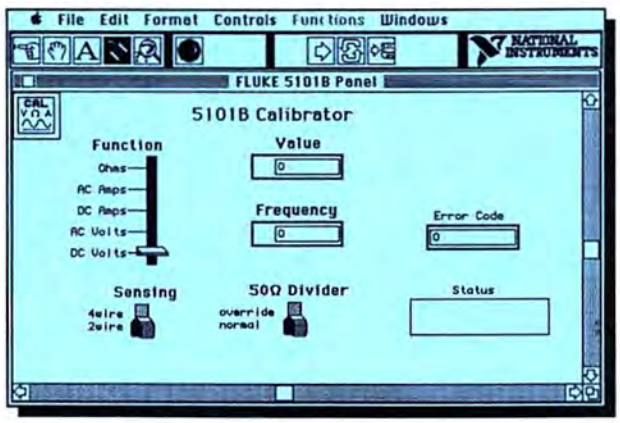
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LabView's programming language, G, is based on the notion of visual flow control. Rather than writing program statements, you use the thread tool to wire up inputs and outputs. The broken arrow in the tool palette (to the left of the National Instruments logo) shows that this diagram isn't ready to run yet.



LabView comes with several predesigned virtual instruments that act like commercially available instruments. The front panel from a Fluke 5101B calibrator is shown here.

ditional test for exiting from a While loop or the iteration number of a For loop) are wired directly to the loop icon's control point. It's simple.

Instruments execute when you turn on the "system" by clicking on a Start icon. The Start icon appears broken if the instrument can't execute because wiring is incorrect or incomplete. If you try to start the instrument anyway, a dialog box pops up and tells you where the trouble lies.

Once everything is in order and the system is running, it behaves like an interpreted BASIC program. Each logical step is performed and the instrument continues to the next step. Interpreted execution has both advantages and drawbacks. Arrays don't need to be declared and predimensioned before running, and errors can be found quickly. Interpreted languages, however, require that the interpreter program always be loaded, and the additional overhead means that they execute much more slowly than they could.

LabView isn't yet *MultiFinder*-aware, so it doesn't run instruments in the background (though it will run under *MultiFinder*). It also doesn't access a 68881 coprocessor, except in some specialized manipulation routines. National Instruments assures me that a *MultiFinder*-aware, 68881-accessing, compiler version of the program is being developed, so the company plans to correct these inconveniences.

THE RESULTS ARE IN

The combination of hardware and software you choose for your application should be guided by the kind of instruments you need to control, the level of experience you have with programming in various languages, and the sophistication level of your equipment's daily users.

If your data-acquisition needs are fairly modest in speed and number of points acquired and you don't mind hand-downloading data or writing a very short *Turbo Pascal* program occasionally, MacPacq might be just the answer. Its portability, ability to gather data while not connected to a Mac, and budget price are assets. If, however, you need faster sampling rates, better resolution, more channels, more sophisticated frequency control, or interfaces to *Parameter Manager or LabView,* invest in MacADIOS II.

If you choose MacPacq, then your only decision is whether to use the included *PacqManager* software or to write your own routine in *Turbo Pascal*. That choice is simple: If *PacqManager* does what you want, stick with it; otherwise, use Pascal.

If you choose MacADIOS II, though, then shop around. *LabView* is probably the best choice if you do complex programming or repeat the same tests over and over again. You'll find yourself using it for a lot more than just controlling MacADIOS II. If the bookkeeping aspects of your experiments weigh you down and you need a place to organize all the data you collect, consider *Parameter Manager* with *pmMacADIOS*. If your application is vertical and worth some programming effort, you might want to consider the available interface libraries to popular languages. Finally, if your project is not well defined and you find yourself adapting to lots of differ-

MACUSER RATING

MacPacq and PacqManager $$$

Follows Mac Interface	■ ■ ■ □ □
Printed Documentation	■ ■ ■ □ □
On-Screen Help	None
Performance	■ ■ ■ □ □
Support	N/A
Consumer Value	■ ■ ■ ■ □

Comments: Hardware and software that transforms the Mac into a digital oscilloscope, waveform generator, and chart recorder. **Best Feature:** Software expandable via external routines in *Turbo Pascal* and other languages. **Worst Feature:** Most data manipulation must be performed by another program. **List Price:** $995 for MacPacq and *PacqManager*. Hardware manufactured and software published by Biopac Systems, 42 Aero Camino, Suite 215, Goleta CA 93117; (805) 968-8880. Version 1.03 of *PacqManager* software reviewed. Not copy protected.

ent situations, *MacADIOS II Manager* will help you get started.

Just remember, no matter which system you choose: Macs make great lab assistants. They rarely talk back, and they don't need to sleep. Which is more than I can say for myself.

LINDA CUSTER IS A GRADUATE STUDENT AT UC BERKELEY WHO SOONER OR LATER WILL HAVE TO FACE FACTS AND ENTER THE REAL WORLD OF BIOCHEMICAL ENGINEERING.

MACUSER RATING

LabView ★★★★

Follows Mac Interface	■ ■ ■ ■ ■
Printed Documentation	■ ■ ■ ■ □
On-Screen Help	■ ■ ■ ■ □
Performance	■ ■ ■ ■ □
Support	N/A
Consumer Value	■ ■ ■ ■ □

Comments: Graphics programming environment for creating virtual instruments to perform calculations, acquire laboratory data, and control instrumentation. **Best Features:** Intuitive interface and excellent error feedback. **Worst Feature:** Roughly the speed of interpreted BASIC. **List Price:** $1900. Published by National Instruments, 12109 Technology Blvd., Austin, TX 78727-6204; (512) 250-9119. Version 1.1 reviewed. Not copy protected.

MACUSER RATING

MacADIOS II ★★★★

Follows Mac Interface	■ ■ ■ ◧ □
Printed Documentation	■ ■ ■ □ □
On-screen Help	None
Support	■ ■ ■ ■ ■
Consumer Value	■ ■ ■ ■ □

Comments: Hardware, software, and software interfaces to manage Macintosh data input and output with laboratory instruments. **Best Features:** Hardware is flexible — standard configuration samples up to 142 kHz; daughterboards provide faster sampling, more channels, and improved resolution. **Worst Feature:** Documentation is sketchy or incomplete in parts. **List Price:** $1290 for 5-μs Macintosh II-ready data-acquisition card and additional $700 for hardware required to install in Macintosh SE; $600 for *MacADIOS II Software* interface; $1000 for *MacADIOS II Manager*. Hardware manufactured and software published by GW Instruments, 264 Msgr. O'Brien Hwy., Cambridge, MA 02141. MacADIOS II card in SE expansion chassis and SE expansion card reviewed.

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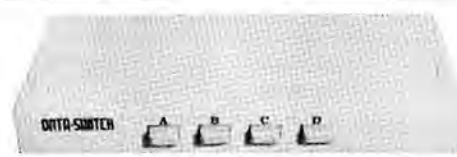
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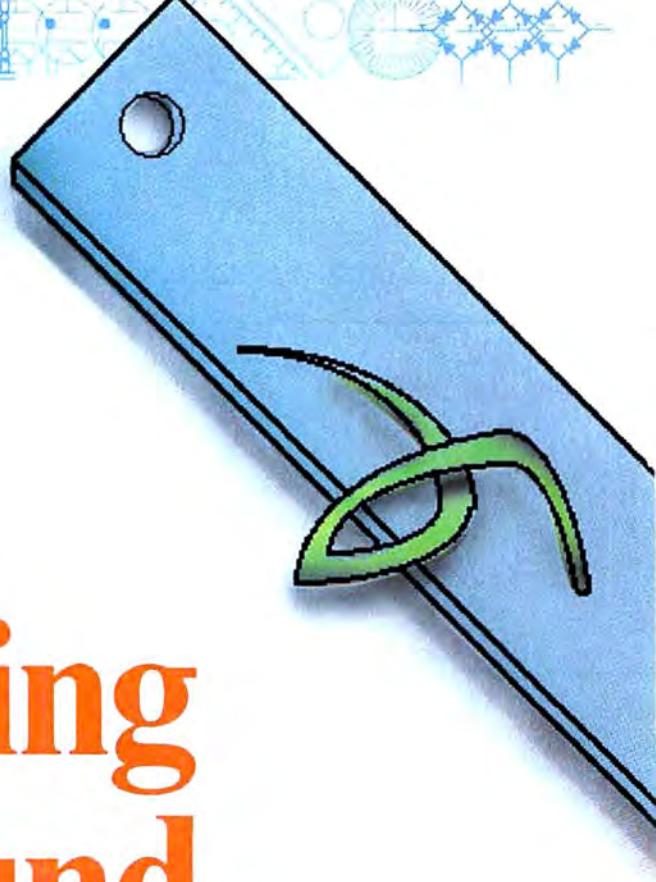
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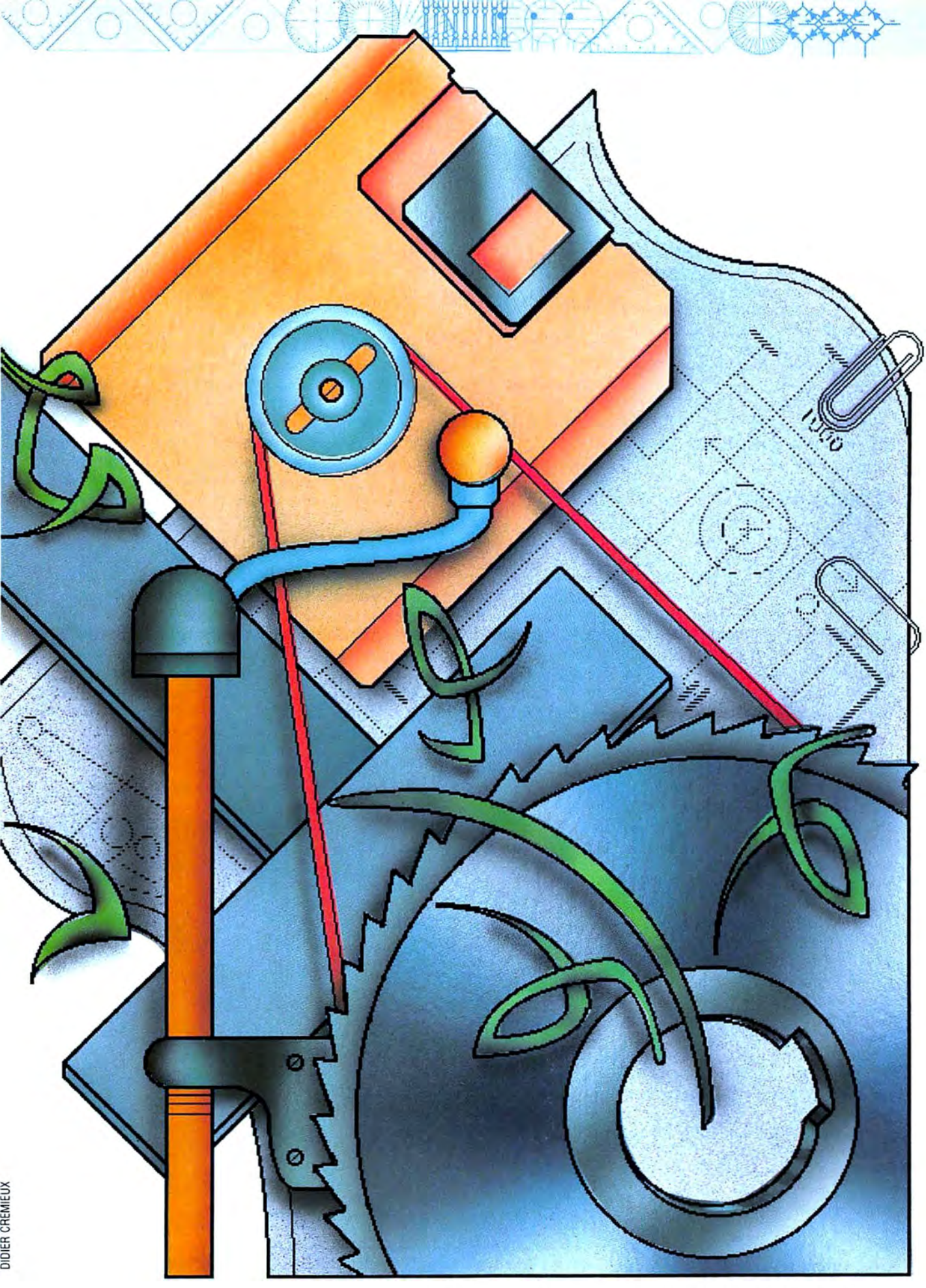
EZ-Mill puts the Mac to work on the day, night, or swing shift at large factories and small machine shops alike.

Going from the drawing board to a finished product is the CAM (computer-aided manufacturing) part of CAD/CAM. You just dump what you've designed with a CAD package into a CAM program, and it controls the tooling and milling machines that form the product. Such solutions are expensive, though — $100,000 isn't unusual — and difficult to use. CAM software sometimes requires an engineer with a firm grounding in computer programming.

Now, *MacEZ-CAM* with *EZ-Mill,* from Bridgeport, is bringing CAM within the reach of even small machine shops. Not only is it inexpensive, comparatively speaking, but it also eliminates complex mathematics, so that most machinists are able to run the software.

CAM had its beginnings nearly 40 years ago, when it became quite clear that conventional manufacturing would not be able to handle the future needs of the aircraft industry. The Massachusetts Institute of Technology was contracted to develop a control system that, instructed by the output of a computer, could drive a slide lead screw through an interface; it had to be applicable to a wide variety of machine tools. In 1952, MIT demonstrated this technology. It used prepunched tape as the input medium and was called Numerical Control (NC). Second-generation machines used smaller vacuum-tube circuits and, later, solid-state circuits.

BY RICHARD WOLFSON



DIDIER CREMIEUX

As computer technology improved, NC underwent rapid changes. The use of read-only-memory technology produced controls that were less expensive and more powerful and reliable, leading to the appearance of Computer Numerical Control (CNC). CNC later saw successful introduction into practically every manufacturing process. Drilling, milling, and turning occurred on "machining centers" and "turning centers."

With Bridgeport's *MacEZ-CAM* software, the power to control these machines now resides solidly on the desktop.

THE EZ-CAM PACKAGE

EZ-Mill is the software that makes part programming for CNC milling machinery easier and faster, but it's only one of the packages that comprise the *MacEZ-CAM* line. *EZ-Turn* is for lathes, *EZ-EDM* controls electric-discharge milling machines, and *EZ-Surf* lets you define a part by using a series of XYZ mesh points linked by splines, lines, arcs, or a combination of these elements.

EZ-Mill, which I reviewed for this article, has four interrelated modules: Simplified Interactive Part Programming, Build, Post, and NC-Run. The SIPP module defines geometry, machining cycles, tool descriptions, and part paths. The Build module lets you create CNC information files. The Post module combines the part program you've created with SIPP and the CNC information file you've created in the Build module, generating a CNC part program. The NC-Run module reads the CNC part program, displays the cutter-tool centerline, and computes an estimated machining time for the part. NC-Run reads any CNC part program that has been post-processed for any of the BOSS (Bridgeport Operating Software System) controls.

EZ-Mill version 4.0m is an update that makes extensive use of the Mac environment compared to previous versions. It's fully compatible with a wide range of software and hardware: *Switcher*, *MultiFinder*, *AppleShare*, desk accessories, the LaserWriter, and large-screen displays. It runs on the Mac Plus or SE in one version and on the Mac II in color in another version that's optimized specifically for the 68020. Bridgeport claims that the Mac II version runs five times faster on the II than its comparable software running on a 386 MS-DOS machine.

> CAM had its beginnings nearly 40 years ago, when it became quite clear that conventional manufacturing would not be able to handle the future needs of the aircraft industry.

USING EZ-MILL

The first step in the CAD/CAM process is to create or import part geometry. The SIPP module allows you to generate a part from scratch or import any IGES-format graphic file, such as those created by *AutoCAD* or *VersaCad*.

The following process creates the geometry necessary for the plate in Figure 1.

The setup lays the groundwork for the part program. You establish an origin (x and y zero coordinates) in the window in which the part will appear. For the plate project, the origin is the center of a 1.5-inch bolt circle.

"Geometry" is the basic layout of a part. It consists of points, lines, and circles that you later connect by using the Create Path command from the Part Program menu. The geometry is global throughout the part program; any change you make to it affects all later tool paths that use that geometry. Define is the default mode for geometry, but it's only one of nine available.

Inputting geometry with SIPP is a breeze — you use a combination of clicking in the window and typing in numbers. Once you have multiple elements in the window, it's easy to choose a single one with the mouse — a click chooses the element closest to the cursor.

You can input points, lines, and cir-

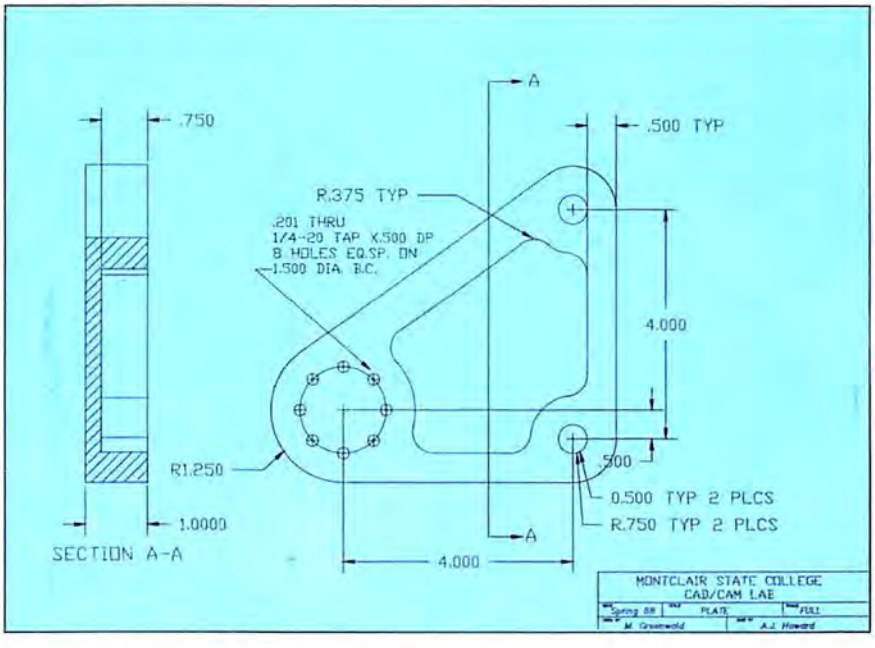


Figure 1: This working drawing of the plate to be machined with *EZ-Mill* was not created in *EZ-Mill*.

Cocaine can make you blind.

Cocaine fools your brain.

When you first use it, you may feel more alert, more confident, more sociable, more in control of your life.

In reality, of course, nothing has changed. But to your brain, the feeling seems real.

From euphoria...

You want to experience it again. So you do some more coke.

Once more, you like the effects. It's a very clean high. It doesn't really feel like you're drugged. Only this time, you notice you don't feel so good when you come down. You're confused, edgy, anxious, even depressed.

Fortunately, that's easy to fix. At least for the next 20 minutes or so. All it takes is another few lines, or a few more hits on the pipe.

You're discovering one of the things that makes cocaine so dangerous.

It compels you to keep on using it. (Given unlimited access, laboratory monkeys take cocaine until they have seizures and die.)

If you keep experimenting with cocaine, quite soon you may feel you need it just to function well. To perform better at work, to cope with stress, to escape depression, just to have a good time at a party or a concert.

Like speed, cocaine makes you talk a lot and sleep a little. You can't sit still. You have difficulty concentrating and remembering. You feel aggressive and suspicious towards people. You don't want to eat very much. You become uninterested in sex.

To paranoia...

Compulsion is now definitely addiction. And there's worse to come.

You stop caring how you look or how you feel. You become paranoid. You may feel people are persecuting you, and you may have an intense fear that the police are waiting to arrest you. (Not surprising, since cocaine is illegal.)

You may have hallucinations. Because coke heightens your senses, they may seem terrifyingly real.

As one woman overdosed, she heard laughter nearby and a voice that said, "I've got you now." So many people have been totally convinced that bugs were crawling on or out of their skin, that the hallucination has a nickname: the coke bugs.

Especially if you've been smoking cocaine, you may become violent, or feel suicidal.

When coke gets you really strung out, you may turn to other drugs to slow down. Particularly downers like alcohol, tranquilizers, marijuana and heroin. (A speedball—heroin and cocaine—is what killed John Belushi.)

If you saw your doctor now and he didn't know you were using coke, he'd probably diagnose you as a manic-depressive.

To psychosis...

Literally, you're crazy.

But you know what's truly frightening? Despite everything that's happening to you, even now, you may still feel totally in control.

That's the drug talking. Cocaine really does make you blind to reality. And with what's known about it today, you probably have to be something else to start using coke in the first place.

Dumb.

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cles of known or unknown radii, choosing among many options for generating each. For instance, you can define circles of a given radius from center points, center coordinates, through two points, at a point tangent to a line, tangent to two lines, at a point tangent to a line and a circle, or tangent to two circles. You can also define complex arrays of points by using a function or an expression in the display-entry box. Valid mathematical functions include sine, cosine, square root, absolute value, natural logarithm, power, exponent, arc tangent, pi, and the user-defined coefficients that appear in the Coefficients menu.

The Undo command in the Concurrent Commands palette is particularly useful when you're creating circles tangent to two lines, since the program has a choice of four locations in this situation. As you get more proficient at click placement, surprise elements become less and less common. When an unexpected element does appear, however, Undo can eliminate it.

Figure 2 shows the completed geometry of our sample plate.

TOOL PATHS

After you've finished the geometry, you create tool paths; each path is called a segment. The part we're creating needs seven segments: rough-profile milling, finish cut, pocket rough-milling cycle, pocket-finishing cycle, two drilling cycles (1-inch holes and tap-drilled holes), and the tapping cycle.

Selecting Segment ID from the Part Program menu results in a series of prompts. The first is for the segment ID itself. (Later, you'll combine segments into the entire part program.) The next prompt is for a cycle type; in this case, it's a milling cycle. Next is the type of milling cycle; we need a contour milling cycle.

Tool information is next. Tool diameter, tool-change position, spindle feeds and speeds, and Z-data all go into the numeric entry box as you receive prompts.

Tool offset, the next parameter you can input, is particularly useful on machines such as the one we use here at Montclair State College because the BOSS 4 operating system of our Series I CNC does not have cutter compensation. This offset feature effectively eliminates the need for compensation. The finish allowance on this project is .025 inch, so you enter the offset as .25 + .025 inch (cutter-tool radius plus finish allowance).

To define the tool path, you choose Create Path from the Part Program menu. The program prompts you to click on an initial point, and then you define the path by moving the cursor from intersection to intersection around the perimeter of the part. Undo cancels the last move and deletes the point just created.

Next, you verify what you've done so far. The Verify Chk option displays the path and a representation of the cutting tool. This feature saves a lot of time in troubleshooting a part program. Figure 2 shows the check on the first path for the plate.

You enter subsequent paths in much the same manner. You can use powerful built-in options, such as auto-rounding for fillets, symmetry options, and translations, and even create multiple holes using angular dimensions.

When you have two paths that are very similar, as is the case in this project for the profile milling and the finish cut, you can copy an existing path, rename it, and change some of its parameters. A powerful feature of *EZ-Mill* is its ability to zoom in on a very tight area — you can view differences of less than .001 inch. Figure 3 shows the Zoom feature in the Verify Chk option.

It's hard to make a mistake during this process. The defaults are best guesses on the program's part, but when you change anything, that information becomes the default for successive entries. This feature works throughout all modes of *EZ-Mill* and speeds things up considerably during input.

You can use the 3D View option in

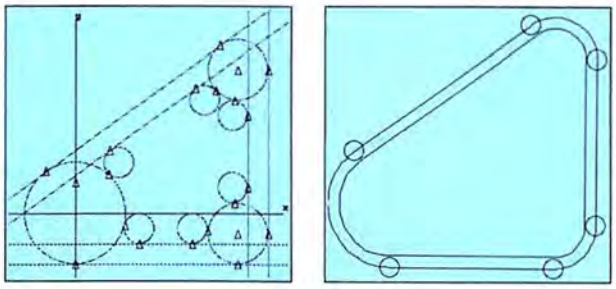


Figure 2
At the left, the completed geometry for the plate. On the right, the tool path from the Verify Chk option for the first segment.

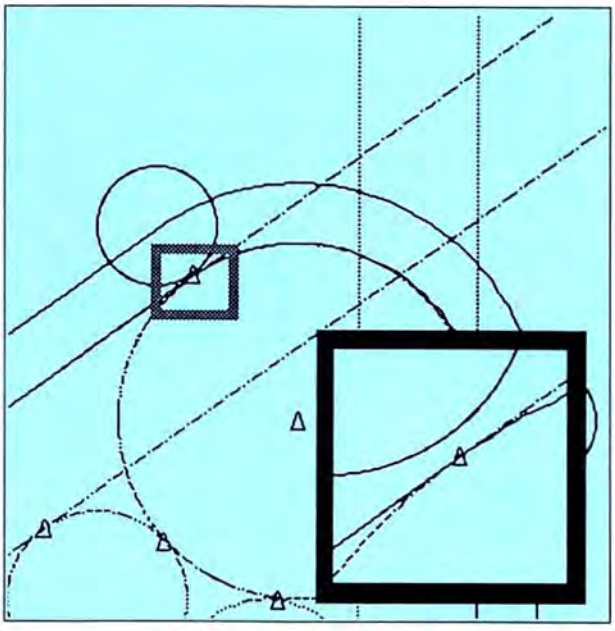


Figure 3
The Zoom feature in the Verify Chk option. The inset is a magnification of the area bordered in gray in the main figure.

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setup. It's a powerful and impressive feature. The default values in this mode produced the view in Figure 4. You can change the orientation of the display around any axis or have it drawn as an isometric.

THE POST AND NC-RUN MODULES

After you've entered and verified the tool paths, you use the Post module to convert the part program to run on a particular CNC milling-machine control. The Post module does the processing, and the post-processed file then goes to your machine to produce the part.

The Post module needs both the part program you created in SIPP and a CNC information file to create the file. The package includes information files for standard CNC controls. If you use a control that does not conform to international standards (EIA RS-274C), you can generate an information file by using the Build module.

If you were generating a part program by hand, you would need to set up your machine at this point (a process that can consume considerable time) and machine some material. If you quoted prices for a particular part, you would note the amount of time it took to perform all operations, since machine time is very expensive. The NC-Run option allows you to simulate the machining of a specified part. It draws the center line of the tool and provides an estimated machining time for the part. This option has saved countless tools, fixtures, and material in our laboratory. Figure 5 shows the completed program run under NC-Run.

MACHINE INTERFACES

Now that the program is finished, it's time to cut some metal. The EZ-Utilities application on the disk provides the computer-CNC interface. Available communication options are on the pull-down menus. The EZ-Link menu gives direct access to part programs stored in the Mac from Bridgeport BOSS 8, 9, or 10 controls. You can upload or download any file via the REMOTE and DNCLINK utilities at the machine tool. Communication here can be at speeds up to 19,200 baud through the Mac's modem or printer port. In the case of Montclair State, direct numerical control was not possible, since we had BOSS 4 firmware. We had to download the program into the CNC editor and then execute it. In this circumstance, the Mac behaves similarly to the old-fashioned Teletype terminal we've been using for input. We could have punched a tape instead and entered the program via the tape reader.

All that's left now is to set up tools, index some stock, and make the part.

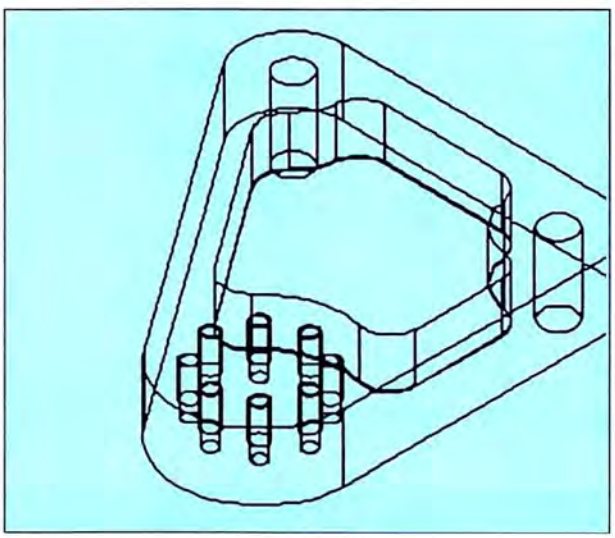


Figure 4
The 3-D view of the plate (compare to the pictures in Figure 2).

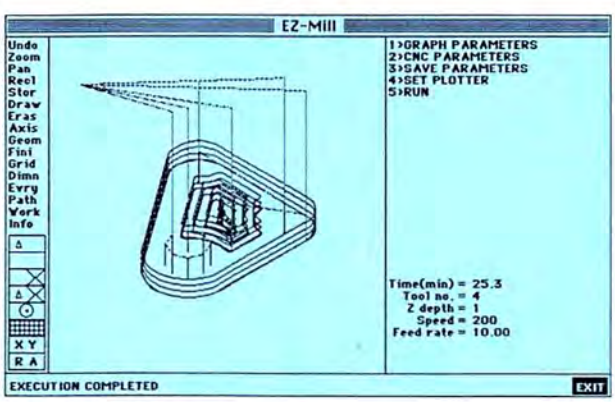


Figure 5
The completed program run under NC-Run.

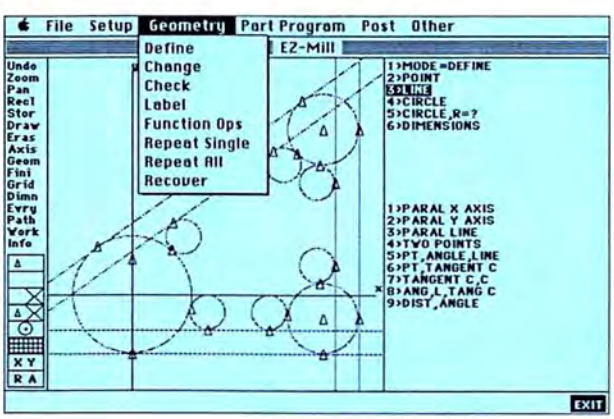
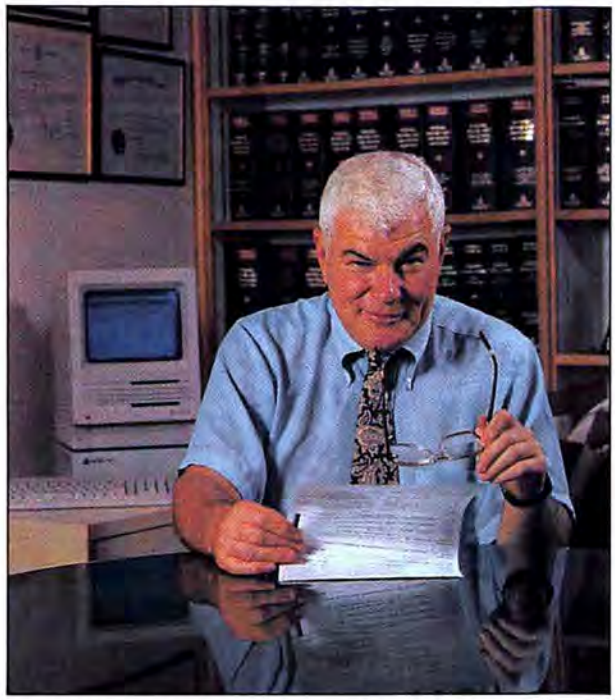


Figure 6
The screen as it looks with the completed geometry in the entire working window. The list of words and icons along the left is the Concurrent Command palette. At the right are the line options in the Define mode. You can select items by clicking on them or by typing the numbers. Note the Exit button in the corner, a decidedly un-Macish touch.

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"A few years ago, while my son was at Harvard, I bought him a Microtech 800k floppy disk drive for his Macintosh. I think I was one of the first to buy one - in fact Microtech had just released the product. I remember they were hard to get at the time. Well, my son's graduated now and working in the computer field, but he's still crazy about his Mac - and his Microtech drive. He even started to convince me that I should have a Macintosh computer and Microtech drive for my law practice. Well believe me, he can be pretty convincing.

I began to do some research. I was already impressed with the Macintosh, but I knew I would need a hard drive. I called Microtech again and was glad to find their selection of internal and external hard drives to be quite extensive. When I heard that Microtech drives were chosen by my alma mater Dartmouth, I was becoming even more convinced. I am familiar with Dartmouth's incredible computer network. Then when I realized that Microtech was offering a 5 year warranty on their hard drives, I needed no further persuading. From personal experience I knew Microtech would be around long enough to give me the service and support I was looking for. Once I was sold on the Mac, I was definitely convinced Microtech had to be the right choice - no, the only choice - for a hard disk drive, just as it had been for my son's 800k drive a few years ago."

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A once long and laborious task has been eased considerably by *EZ-Mill*.

DRAWBACKS

EZ-Mill has a few problems, especially in the area of interface. This program is the fourth generation of Bridgeport's CAD/CAM offerings. The interface remains basically similar to that of the original, which ran on a Columbia Data Products workstation. The first *MacEZ-CAM* used little of the Macintosh interface. This version uses pull-down menus and standard icons and file format, which are a big improvement.

The modal operation of all the modules is another problem. Then there are the smaller things. Undo, for instance, is not on the Edit menu, where I expected it. It's in a Concurrent Command palette instead. Little things like that get in the way of people who are used to working with the Mac.

In Bridgeport's defense, most, if not all, of the users of this program are unfamiliar with the Mac until they use *MacEZ-CAM*. Most users are small-job-shop operators (people who make things for use in other companies' products). They buy this software either when they purchase a new piece of CNC equipment from Bridgeport or when they realize that it is unprofitable and time-consuming to manually part-program. Packages with CNC, tooling, computer, software, and support can cost upwards of $100,000. Although this interface is still somewhat nonstandard, one of my students unfamiliar with the Mac had no trouble following the tutorial and producing a part on his first try.

Problems are not confined to the interface, but the program has no major bugs. The most annoying thing is that the geometry generation makes no provisions for partial lines or arcs, which crowds the screen when you're dealing with complex parts. Lines extend from edge to edge unnecessarily, and the program draws full circles where only a few degrees would do. On the Mac II, this problem is less pronounced, since the tool paths are in color; this eliminates some of the confusion. Although this program is not intended for drafting, I would really like to see partial-arc and -line features in future versions.

> This program is the fourth generation of Bridgeport's CAD/CAM offerings. The interface remains basically similar to that of the original, which ran on a Columbia Data Products workstation.

DOCUMENTATION AND SUPPORT

MacEZ-CAM's manuals are complete and easy to follow. Bridgeport supplies both a user manual and a technical manual. The user manual contains a very good tutorial that takes you step by step through a program. The technical manual is complete and even gives the pinouts of cables necessary to interface the Mac to various controls. One thing the user manual omits is an index. A detailed table of contents is no substitute for an index. Bridgeport promises a full index in the next revision of the manual, however.

Bridgeport's support policy is excellent. It includes a free two-and-a-half-day training seminar when you buy *MacEZ-CAM* as a package with the Mac. (The programming seminar is also available at a minimal charge for those who choose to buy just the software package.) The company has a toll-free number with experts at the other end — the Bridgeport Application Engineers are well known for their expertise.

This software is protected. Although you get two hard-disk installations, copy protection is unnecessary in a program such as this. The people who need to use this program will buy it in order to receive Bridgeport's excellent technical support. This support is necessary because the software, in effect, turns the Mac into a front-end of a very expensive output device.

SUMMARY

All this power makes *EZ-Mill* a very powerful tool indeed. Mills, lathes, and saws have been the staples in manufacturing in the past, but now new tools are available, and the computer is one of them.

Power does not come cheap. Ignoring the price of the hardware (some machining centers cost upwards of a quarter of a million), this software is pricey. Of *EZ-Mill*, *EZ-Turn*, and *EZ-EDM*, the first one you buy is $6000, and subsequent packages are $2000 each. *EZ-Surf* is $6000, regardless of when you purchase it.

With the software, however, you get not only machining power but also the backing of Bridgeport, a company whose name has become synonymous with machine tools. The two are worth the price.

DR. WOLFSON IS A PROFESSOR OF INDUSTRIAL STUDIES AT MONTCLAIR STATE COLLEGE IN NEW JERSEY AND, AFTER REVIEWING THIS SOFTWARE, IS CONSIDERING GETTING A MAC II FOR HIS DESK AFTER ALL.

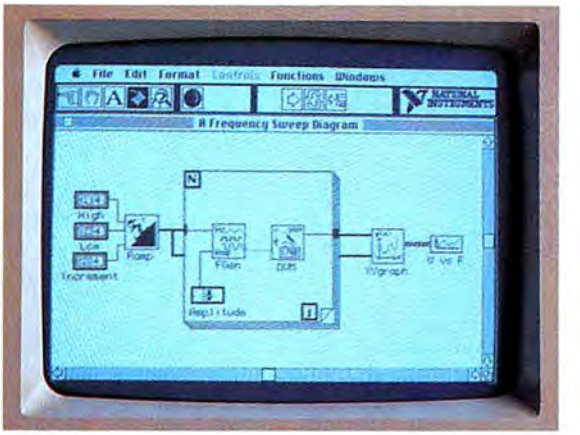
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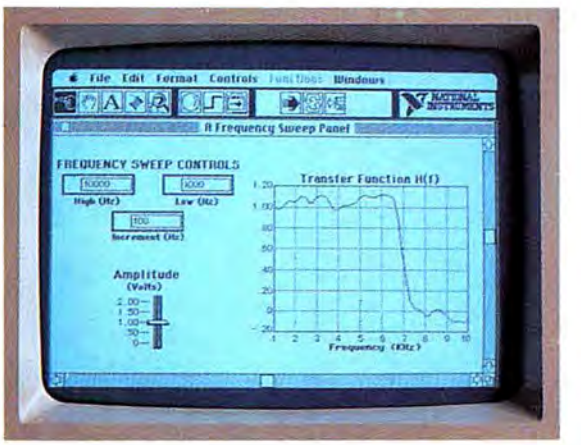
MacEZ-Mill ★★★★

Follows Mac Interface	■ ■ □ □ □
Printed Documentation	■ ■ ■ ■ □
On-Screen Help	None
Performance	■ ■ ■ ■ ◧
Support	■ ■ ■ ■ ■
Consumer Value	■ ■ ■ ■ ◧

Comments: *MacEZ-Mill* is for professionals. It lets you quickly write part programs that only very experienced designers could execute in the past. Its ability to simulate machine operation on-screen in a compressed time frame can offset the price of the program, because you save machine time and avoid costly errors. **Best Feature:** The combination of speed, power, and ease of use. **Worst Feature:** Lack of full Mac interface. **List Price:** $6000. Bridgeport Machines, Inc., 500 Lindley Street, P.O. Box 32, Bridgeport, CT 06606. (203) 367-3651. Telex: 212731. Software copy-protected.







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Alternative Mice Styles

Mice and trackballs and tablets, oh my! A roundup of Macintosh pointing devices.

The route to CAD/CAM is a direct one — all you need is a Macintosh, a good CAD/CAM program, and an input device. Selecting the program is relatively easy. It's simply a matter of determining which program offers the tools you need, factoring in ease of use, reading some comparative reviews of the programs available, and making your choice. Selecting an input device is more complicated. In a world of mice, trackballs, and graphics tablets, reading reviews is only half the solution.

Choosing an input device is subjective. It's like buying a vehicle. The question is not, "What works?" — a bicycle, a truck, a sports car, or a luxury car will get you where you're going. The question is, "What will the ride be like?" The "right" input device won't bestow on you new ideas, fresh insights, or greater creativity and skill. What it will do, however, is make the execution of your project easier, possibly faster, and definitely more comfortable.

SKATEBOARD TO LIMOUSINE

Input devices can be classified as mouse (relative pointing device) or tablet (absolute pointing device). The mouse is like the skateboard — if you want to move, you have to push. The screen-pointer or cursor location is the starting point, no matter where the mouse (or other relative-mode pointing device) is placed on the working

BY ROBERTA SCHWARTZ

TOM UPTON



surface. The mouse instructs the screen pointer to follow its movements and go to the changes in x,y coordinates.

Relative pointing devices also include trackballs and tablets working in mouse mode. For day-to-day Macintosh applications such as word-processing programs, spreadsheets, and so on, these devices are fine; indeed, many people are satisfied with using them for graphics applications too. If luxury is your style, however, you'll want an absolute pointing device. More specifically, you'll want a graphics tablet — the chauffeured limousine — just point your pen and the cursor goes.

When you use an absolute pointing device, the screen-pointer location and the pointing-device location are directly related. The screen pointer responds to the absolute x,y coordinates being transmitted by the pointing device; your hand shares a direct relationship with the screen cursor. With absolute pointing devices, not only is freehand sketching considerably easier but also tracing images is a snap. Absolute pointing devices include traditional graphics tablets and Felix, a new device that seems to defy description. More on Felix later.

TAKE THE BUS

Absolute or relative, if you're using a Mac SE or Mac II, you'll want an ADB device. The Apple Desktop Bus, a low-speed synchronous serial bus, is now the standard connecting port on all the new Apple computers. What does this mean to you? It means faster and more accurate reading of your input device. The ADB is controlled by an independent microprocessor accessed through the VIA chip. It's supported by special mouse and keyboard drivers that pass user-generated input events directly to the Toolbox Event Manager. It means portability and compatibility. The Apple IIGS, Macintosh SE, and Macintosh II ADB devices are fully interchangeable. It means flexibility.

The ADB is capable of supporting up to 16 input devices via a daisy chain. You can connect a keyboard, a mouse, a graphics tablet, a trackball, and who knows what else and move from one to the other.

Chances are you won't need 16 devices connected at one time, but you may well want 2 or 3 (don't forget the keyboard!). Suppose you're working on a project with partners. You're all sitting at the Mac and discussing alternatives to the design. He says, "Try moving the gear to the other side." You ask,"Left or right?" He responds "Left." You make the move. She says, "Make it a little higher." Get the picture? Now, take the same scenario but this time you have two tablets, two trackballs, or one mouse and one tablet connected. Each of you controls a device. He moves the gear exactly where he wants it. You move it somewhere else. She adds a line and you add another. Presto! Interactive editing — thanks to ADB.

By the way, if you're using a 512K Mac or a Mac Plus, you can still use ADB devices. The ADB Bridge, from Olduvai Corporation, is a hardware interface that allows you to connect a 512K Mac or a Mac Plus to the new ADB peripherals. Have an old faithful input device that can't connect to your SE or Mac II? No problem. The ADB Bridge works both ways; the same little box can connect your old peripherals to your new Mac.

THE CHOICE

If you discount the keyboard, the entire showroom of input devices includes only three basic models: mice, trackballs, and graphics tablets. Of these, I would recommend only one device for CAD/CAM or other graphics applications — the graphics tablet. Still, you should make an educated decision. To help you do so, here's a brief summary of some of the products you might consider.

THE MEDIUM IS THE MOUSE

There isn't much to say about mice. The one you're already familiar with, the Apple Mouse, is a mechanical mouse and has proven to be a dependable tool. The advantage of the Apple Mouse is that you don't have to spend any additional money — if you own a Mac, you own an Apple Mouse. If you





Lightgate's Felix resembles a miniaturized joystick. This optical pointing device is accessed by changing the mouse-control instructions on the Control Panel to Tablet.



The A+ Mouse works much like the mouse you're familiar with, but it doesn't have any moving parts. Instead, it uses a narrow beam of light that reflects from its own shiny mousepad.



What's an upside down mouse? A trackball, of course. Kensington's new model (top), and Asher's Turbo Trackball (below) both boast resolutions of at least 200 cpi.

MacLand T.M.

Software

Adobe
Adobe Illustrator $339.

Ashton Tate
dBase MAC 284.

Borland
Reflex Plus 168.
SideKick V2.0 64.
Turbo Pascal 64.
Turbo Pascal Tutor 54.

CE Software
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Cricket Software
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Personal Laser Printer 1,595.
HyperCharger 020 0 Ram 0 68881 749.
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like your mouse but you're unhappy with the occasional balkiness that results from accumulated dirt on the ball or rollers, there is an alternative.

The A+ Mouse ADB is an optical mouse. It has no moving parts: no rolling ball, no bearings, no shafts, and so on. This means no cleaning, repairing, or replacing. It uses a mirrorlike pad that reflects a tiny beam of light to track your movement. How reliable is it? It comes with a lifetime warranty. As a cat owner who has spent more time than she cared to spend cleaning hairs from the "belly" of the Apple Mouse, I found the A+ Mouse a welcome replacement.

THE TRACKBALL DILEMMA

There seem to be two kinds of Mac users: trackball lovers and trackball haters. Trackballs consist of large (approximately 2 inches in diameter) balls mounted on top of a base. Above, below, or alongside the ball are one or two buttons for clicking. Because you move the ball and not the base, you don't need as much desk space as you need with the mouse.

Trackballs depend upon finger rather than hand movement. Gently push the ball and you can move your cursor a pixel at a time. Push with a little authority and the ball spins. Your cursor can really zip around the screen.

Kensington Microware's Turbo Mouse ADB comes with a bonus gift, a Mouse Pocket, which adheres to the side of your Mac. Kensington is so sure you'll prefer the trackball that it's giving you "a safe place to retire your old mouse with dignity." The Kensington Turbo Mouse comes with a 90-day warranty. By the time you read this, a new version of the Turbo Mouse should be available. I tried the Turbo Mouse ADB, and it performed well. I'm afraid I'm not a trackball lover, though — I find a mouse much easier to control.

Asher Engineering and Abaton also offer ADB trackballs. Asher's Turbo Trackball and Abaton's ProPoint both come with lifetime warranties, and both companies claim their trackballs address 250 counts per inch. (The resolution of a device is measured in counts per inch [CPI]. This refers to the number of addressable points per inch, or the number of counts that occur as the device is moved across the active area. The Apple Mouse ADB, as a point of reference, offers 90 CPI.)

A TABLET FOR DRAWING

The graphics tablet is the only input device that is akin to drawing with a pencil on a drawing board. A tablet package consists of the tablet and a choice of drawing devices, such as a stylus, which is most like a pencil or pen, or a puck, which is similar to a mouse, albeit much more accurate. A stylus usually has a retractable tip (pressing this tip down is equivalent to clicking the mouse), and it may have one or more buttons for input. Pucks have buttons, and in addition, they have plastic pieces embedded in or protruding from them. These plastic pieces with cross hairs etched on them facilitate tracing. The puck is usually the device of choice for CAD/CAM work; the stylus is preferable for freehand drawing.

The same companies that manufactured graphics tablets for the first Macs are still supplying them today. Summagraphics has a fine reputation in the graphics tablet market. Its MacTablet was the first tablet for the Mac. I bought it as soon as it came out and was disappointed in its design. For one thing, the tablet surface had a rough texture. In order to work on it, you had to cut a piece of acetate and cover the surface. The stylus tip, made of nylon, was not as smooth and responsive as a metal tip. The tablet came with its own power supply; one cord connected the stylus to the tablet, one cord connected the tablet to the Mac, and another cord connected the tablet to the power box. Too many cords! An ADB version of MacTablet is on the horizon, but it wasn't available for review at the time of this writing.

The Macintizer tablet in its original non-ADB configuration was an excellent tablet. I found it to be the most responsive graphics tablet available for the Mac. Its only problem was its size. The tablet was quite large, and only two-thirds of it was working area. GTCO is about to release an ADB version of the Macintizer; it, too, was unavailable for review.

Kurta was the first to market an ADB tablet. The IS/ADB comes standard with a single-switch corded pen and an interface cable compatible with the Apple Desktop Bus. A variety of cordless and corded pens and pucks (which Kurta calls cursors) are available as additional pointing devices. The cordless pointing devices offer the most freedom, but they track somewhat slower than the corded devices do. The screen pointer tracks the





The Kurta IS/ADB is an ADB tablet that comes with a corded pen, but which also supports a number of other pointing devices, including cordless pens, and pucks (right).



The Bit Pad Plus ADB is Summagraphics' new, ADB graphics tablet. This replaces their earlier unit, the MacTablet, and should be available by the time you read this (above).

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pointing-device movement whenever the pointing device is within approximately ½ inch of the surface. This means you can place a drawing, a blueprint, or even a thin manual on the tablet and trace over it. A protective transparent surface covers the active area of the tablet. It allows smooth operation of the pointing device and also provides a place to install menus or drawings for tracing.

When powered on, the tablet is in mouse (relative) mode. Kurta also offers a program, called *Penworks*, that can switch the tablet's operational mode to absolute. *Penworks* requires Apple System Release 5 (*Finder* 6.0 and *System* 4.2). The *Penworks* program I used was a preliminary version, and although a Kurta representative assured me that absolute mode works fine, when I tried it my system crashed. The problem may be the *Penworks* disk or a conflict with one or some of the files (*Suitcase*, *QuicKeys*, Inits, and so on) that I have on my hard disk. I haven't resolved it as of this writing.

Kurta offers a lifetime limited warranty for the tablet and a one-year warranty for the pointing devices. I would recommend the IS/ADB, but currently it's available only in one size — 8 ½ X 11 inches. This size is fine for general graphics applications but small for CAD/CAM. For another reviewer's notes on the IS/ADB, see "Quick Clicks" in the January '88 issue of *MacUser*.

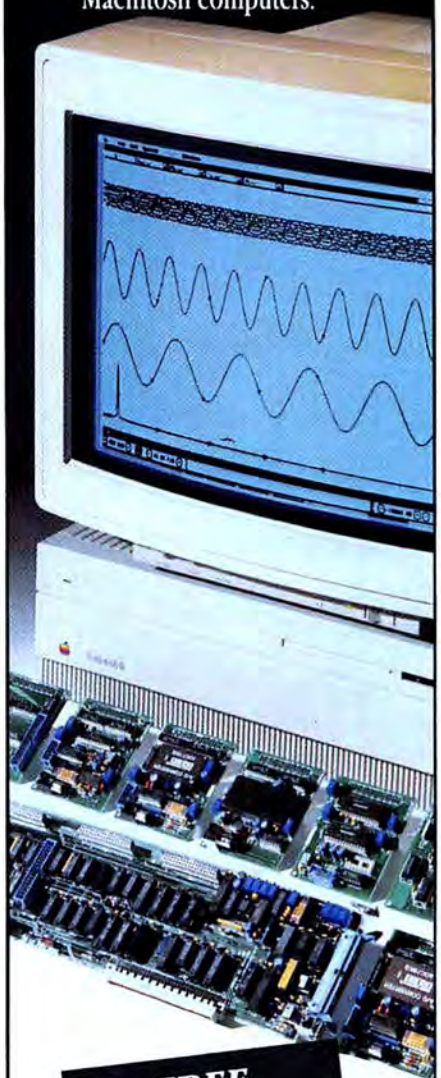
NOT JUST A CAT ANYMORE

Felix is currently in a category all of its own. Lightgate calls it the first post-mouse input device. It features miniature optical-data tablet technology that gives precision pointing in a small space. Felix looks like a joystick, but based on its mode of operation, it's a tablet. Indeed, to use Felix you must access the Control Panel to change the pointing mode from mouse to tablet. You teach Felix the size of your screen by running the pointer around the perimeter of the monitor screen. Felix's joysticklike handle operates within a 1 ½-inch area.

It has two modes of operation: Normal and Precision. Normal is best suited for operations such as word process-

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ing, menu selection, and so on. Precision mode allows manipulation of the cursor at the pixel level — good for CAD applications or editing bit-mapped graphics. Going from Normal to Precision is as easy as toggling a switch on the right or left of the handle.

Although it took some time to get used to, I found Felix comfortable to work with. In fact, if there weren't graphics tablets, Felix might well be my choice as a graphics input device. An ADB version of Felix is in the works. Felix comes with a three-year warranty.

TEST DRIVE THE PERIPHERAL

If at all possible, try the different input devices to see which works best for you.

You'll be hard-pressed to find a store that carries all of them, especially graphics tablets, so your best bet would be to attend one of the big Mac shows. With luck, some of the ADB graphics tablets will make their debut at the August Macworld Expo. I'm confident that one of these tablets will be just what you need, but do try all the devices — and enjoy the ride.

ROBERTA SCHWARTZ IS THE GRAPHICS EDITOR FOR A+ MAGAZINE. SHE TEACHES AT THE NEW SCHOOL COMPUTER CENTER IN NEW YORK. MOST OF HER TIME IS TAKEN UP BY HER BLACK DOG, HER WHITE CAT, AND HER PLATINUM MOUSE.

Resources

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South Miami, FL 33143
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$129

A+ Mouse
MSC Technologies
2600 San Tomas Expressway
Santa Clara, CA 95051
(408) 988-0211
$129 (ADB) $119 (Mac Plus)

Felix for Mac Plus
Lightgate
6202 Christie Avenue
Emeryville, CA 94608
(800) 426-5324
$149

IS/ADB
Kurta Corporation
4610 South 35th Street
Phoenix, AZ 85040
(602) 276-5533
$395

Macintizer
(ADB version available summer '88)
GTCO Corporation
7125 Riverwood Drive
Columbia, MD 21046
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$590

MacTablet
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ProPoint
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Turbo Mouse ADB
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Plotting Along

Plotters, plotters, everywhere, but what is one to think?

BY GARY HENRY AND DIANE WILDE

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617/935-8820							
Enter Computer							
6867 Nancy Ridge Dr.	SP1000	$3,995	Desk	8.5″×39″×8″	24	HPGL	Sheets
San Diego, CA 92121	SP1800	$4,695	Floor	41″×39″×8″	31.5	HPGL	Sheets
619/450-0601	SP600	$995	Desk	3.2″×18″×11.5″	14		Sheets
Hewlett–Packard							
P.O. Box 3640	HP Draft Pro	$5,400					
Sunnyvale, CA 94088-3640	HP 7475A	$1,895	Desk		15	HPGL	Sheets
800/538-8787	HP 7550A	$3,900					
	HP ColorPro 7440A	$1,295	Desk		15.7	HPGL	Sheets

Picking a plotter from among the plethora available can be as problematical as choosing a car. Even deciding if you need one can be a problem, because most people associate them with architects and engineers and don't recognize that a plotter might be ideal for their own situation. We gathered information on over fifty Mac compatible units and found a suitable plotter for anyone from an architect to a woodworker.

In general, plotters come in one of three configurations: desktop units, flatbeds, and floor models. Desktop units can be small enough to share your workspace, and are often used for making charts. Flatbeds and floor models are usually much larger, and while some desktops can't handle anything larger than a sheet of ledger paper, flatbeds and floor units can make drawings three feet wide and larger.

And when it comes to drawing, you don't have to limit yourself to paper. These plotters can literally work with anything from tissue paper to steel. In fact, we even found one that could be adapted to cut fabric and be used as a pattern maker.

This chart should help you make a decision about whether or not a plotter should be in your future. (Note: All of the plotters use a Hewlett-Packard driver, except for the Houston Instruments units, which have their own.)

Auto-Feed	No.of Pens	Auto-Capped	Media Size	Thickness	Drawing-Size	Type(s) of Media: Paper, Acetate, Vellum Wood, Gloss, Mylar, Film, Cardboard	Interface Baud Rate	Buffer Size	Digitizer
	6	Yes	Any size	Any thickness	D	M,W,G,C,Metal,P,Fabric	110-9600	8K	GTCO emul
	6	Yes	40″×52″	to 1″(2″ opt.)	E	M,W,G,C,Metal,P,Fabric	110-9600	8K	GTCO emul
	6	Yes	50″×100″	to 1″ (2″ opt.)	48″×96″	Any material up to 2″thick	110-9600	8K	GTCO emul
	6	Yes	Any size	to 1″	18″×30″	M,W,G,C,Metal,P,Fabric	110-9600		No
	6	Yes	Any size	to 1″	78″×38″	M,W,G,C,Metal,P,Fabric	110-9600		No
Yes	4		54″ wide		54″ wide				
Yes	8		24″ wide	3 or 4 Mils	24″ wide	P,V,M	110-19200	18K	No
Yes	8		A-D	3 or 4 Mils	A-D	P,V,M	110-19200	18K	No
Yes	8		36″ wide	3 or 4 Mils	36″ wide	P,V,M	110-19200	18K	No
Yes	8		A-E	3 or 4 Mils	A-E	P,V,M	110-19200	18K	No
Yes	8	Yes	A-E	3 or 5 Mils	A-E	P,V,M	110-9600	40K–512K opt.	No
	8	Yes	25″×36″		24″ wide	P,V,F, Gloss, A	19.2K		No
	3 + opt. tool		64″×44″	3/4″		P,A,V,W,G,M,F,C			
	knife or wheel					leather, cloth, canvas			
	1	No	A-D			P,V,F	300-9600	18K	
	8	Yes	A-D			P,V,F	300-9600	16K	
	6	No	A&B		A&B	P,F	selectable	1.5K - 7.5K	
	6	Yes	A&B		A&B	P,F			Yes
	8	Yes	A&A4		A&A4	P,F			

Manufacturer	Model No.	Price	Plotter Type Desk, Flat, Floor, Other	Dimensions H×W×D	Speed (ips)	Driver Language	Sheets & Rolls
Houston Instruments							
8500 Cameron Rd.	DMP-29	$2,295	Desk	5.6″×22″×19″	16	DM/PL	Sheets
Austin, TX 78753	PC Plotter Model 695A	$799	Flat	3.8″×17.5″×7.8″	3	DM/PL	Sheets
512/835-0900	DMP-40	$1,195	Desk, Flat		3	DM/PL	Sheets
800/531-5205	DMP-41/42	$2,295	Floor		3	DM/PL	Sheets
	DMP-51/52	$3,995	Floor		16	DM/PL	Sheets
	DMP-51/52MP	$4,695	Floor		16	DM/PL	Sheets
	DMP-56A	$5,495	Floor		16	DM/PL	Sheets
	DMP-61	$4,695	Floor		32	DM/PL & HPGL	Sheets
	DMP-62	$6,495	Floor		24	DM/PL & HPGL	Sheets
	PC Plotter Model 595	$699					
IOLINE							
19417-36th Ave. West #D1	LP3700	$4,695	Floor	50.75″×49″×9.7″	10	HPGL	Both
Lynwood, WA 98036	LP4000	$5,995	Floor	50.75″×49″×9.7″	20	HPGL	Both
206/775-7861							
JDL							
2801 Townsgate Rd.,Suite 104	850 GL+	$3,845	Desk	7.5″×25.5″×18.75″		HPGL	Both
Westlake Village, CA 91361							
805/495-3451							
Optical Computer Inc.							
1832 South 3850 West	OCI 928	$6995	Floor	47.75″×54.5″×19.5″		HPGL	Both
Salt Lake City, Utah 84104							
801/972-1311							
Roland DG							
7200 Dominion Circle	DXY-880	$1,395	Desk	3.5″×21″×17″	200mm/sec	HPGL	Sheets
Los Angeles, CA 90040	DXY-885	$1,695	Desk	4″×22″×17″	300mm/sec	HPGL	Sheets
213/685-5141	DXY-980	$1,795	Desk	4″×21″×17.75″	230mm/sec	HPGL	Sheets
	DXY-990	$2,295	Desk	4.5″×24″×17.75″	300mm/sec	HPGL	Sheets
	DPX-2000	$5,495	Flat, Floor (w/stand)	31″×5.5″×23″	16	HPGL	Sheets
	DPX-2200	$5,795	Flat, Floor (w/stand)				
	DPX-3300	$7,495	Flat, Floor (w/stand)	34″×46″×7″	450mm/sec	HPGL	Sheets
	GRX-300	$5,295	Floor, drafting	45.5″×40″×21″	20	HPGL	Sheets
	GRX-400	$7,495	Floor, drafting		20	HPGL	Sheets
Schlumberger Technologies							
355 Ravendale Drive	1834-SR	$6890-8890	Floor	45.5″×48.6″×20.1″	34	HPGL,BGL,VDF,FF,HI-DM/PL	Both
P.O. Box 7169	1835-SR	$6890-8890	Floor	51.1″×60.4″×20.1″	34	HPGL,BGL,VDF,FF,HI-DM/PL	Both
Mountain View, CA 94039-7169							
415/964-7900							
United Innovations							
Crossroads Industrial Park	Mural 9000	$3,900	Wall	45″×51″×4″	7	HPGL	Both
Holyoke, MA 01040	Mural "D" Size Plotter	$2,495	Wall	45″×31″×4″	7	HPGL	Both
413/534-4400							
Western Graphtec, Inc.							
12 Chrysler St.	FP5301; FP5303	$3,290	Desk	5.8″×19.6″×20.7″	18	HPGL	Sheets
Irvine, CA 92718-2086	MP3000 SERIES	$1,195-1,895	Desk	4.1″×22.6″×17.9″	15.7	HPGL&GPGL	Sheets
714/770-6010	PD9011	$8,950	Floor	47.2″×52.4″×17.3″	18	HPGL&GPGL	Sheets
800/624-8396 (In Calif.)	PD9111	$5,995	Floor	48″×43.4″×19.6″	18	HPGL&GPGL	Sheets
Zericon							
40491 Encyclopedia Circle	PC-3600D	$2,295	Floor	37″×27.75″×14.25″	7	DM/PL	Sheets
P.O. Box 1669							
Fremont, CA 94538							
415/490-8380							

Auto-Feed	No.of Pens	Auto-Capped	Media Size	Thickness	Drawing-Size	Type(s) of Media: Paper, Acetate, Vellum Wood, Gloss, Mylar, Film, Cardboard	Interface Baud Rate	Buffer Size	Digitizer
No	8	No	8.5″×17″		A&B	P,V,F	300-9600	No	
No	4	No	8.5″×17″		A&B	P,V,F	300-9600	No	
No	1	No	8.5″×17″		A&B	P,V,F			
No	1	No	17″×36″		C&D	P,V,F			
No	1	No	17″×36″		C&D	P,V,F			
No	14	Yes	17″×36″		C&D	P,V,F			
No	1	No	8.5″×48″		A&E	P,V,F			
No	6 (6 opt)		8.5″×36″		A&D	P,V,F			Optional
No	6 (6 opt)		8.5″×48″		A&E	P,V,F			Optional
	8 to 20*	Yes	1.5″-37″		A-E	P,A,V,F,M	300-9600	512K	
	8 to 20*	Yes	1.5″-37″		A-E	P,A,V,F,M	300-9600	512K	
	*optional								
Yes	Ribbon				A-C	P,V		1 MB	
Yes	8		35.8″×96″		A-E	P,A,V	50-9600	7K	
No	8	No	17″×11″		A-B		50-9600	3K	
No	8	Yes	17″×11″		A-B		150-9600	1K	
No	8	No	17″×11″		A-B		50-9600		
No	8	Yes	17″×11″		A-B		150-9600	1K	
No	8	Yes	17″×22″		A-C		50-9600	15K	
No	8	Yes	23″×24″		A-D		50-9600	15K	
	8	Yes	32.66″×21.61″		A-D	P,A,V		18K (expandable to 1MB)	
	8	Yes	42.66″×33.61″		A-E	P,A,V		18K (expandable to 1MB)	
Yes	8	Yes	24.7″×63.5″		A-D	P,V,F		512K	Yes
Yes	8	Yes	36″×63.5″		A-E	P,V,F		512K	Yes
	1	No	34″×45″		A-E	P,V,F & Poster Board	75-9600	1K	
	1	No	25″×34″		A-D	P,V,F & Poster Board	75-9600		Yes
Opt.	10	Yes	11.2″×15.7″		A	P	75-9600		
None	8	Yes	8″×16.4″		A-B	P,V,F		5K-24K	
	4	Yes	34″×46.8″		A-E	P,V,F		256K Optional	
	4	Yes	25″×35.6″		A-D	P,V,F		256K Optional	
No	1	No	18″×36″		C-D	P,V,M	300-9600	2K	

Scroll Over Beethoven

Measure for measure, the marriage of music-notation and page-layout programs is not a happy one. Here are a few ways around the problems.

Music publishing is one of those tasks that the Macintosh should do brilliantly. The graphic interface, the high-res screen, and its forte for handling musical information — as sound "objects" or as MIDI data — all contribute to the Mac's suitability for generating music notation. Add in Adobe's Sonata, a LaserWriter font that contains high-quality renditions of almost every conceivable music-notation character, and you have a formidable set of tools.

Besides generating standard scores and parts, music-notation software has other uses — such as the production of textbooks that use musical examples, songbooks decorated with fancy type and illustrations, music catalogs, and modern scores that combine conventional notation with nonstandard graphics. These projects require functions that lie outside the realm of traditional notation.

Integrating music software with other programs should be easy. Just like any other font, Sonata can be installed in the *System*, where any application can access it. And most music programs treat non-Sonata elements as ordinary QuickDraw objects.

Music-software publishers love to say how easy it is to use their programs with graphics or page-layout programs, cutting and pasting between applications to your heart's content. Unfortunately, they're wrong. It's not that they're deliberately lying; it's that they've just never tried it. If they had, they'd know that it's actually quite difficult to interface music programs with laser-quality graphics software. In fact, some combinations of music and graphics programs can't be used together at all. The standardization

BY PAUL D. LEHRMAN

GARY BUSS

that makes it easy to lay out typeset-quality newsletters, brochures, manuals, and best-selling novels has bypassed music notation.

I come to this unpleasant conclusion only after a long and painful process. I agreed to do a songbook for someone, using a music-notation program to generate the notes and a page-layout program to integrate the music and text. I assumed it would be relatively simple. I had no idea of what awaited me.

But let's start at the beginning.

YOUR MISSION, JIM . . . ER, PAUL

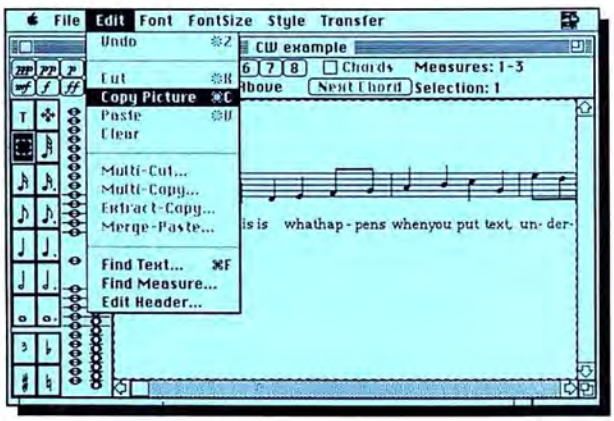
Andy M. Stewart is a Scottish folksinger and the lead singer of the legendary band Silly Wizard. I stole one of his tunes for a MIDI album I produced a couple of years ago called *The Celtic Macintosh*. I sent him a copy, he liked the album, and we became friends. Last fall, he called to tell me he'd been wanting to do a songbook for some time and had been looking around for a way he could publish it himself inexpensively. He wanted to know if I could handle music printing as well as MIDI data on my Scottish-surnamed computer.

I told him I thought it would be no problem, and we agreed that I would produce typeset-quality musical transcriptions of 25 of his songs — simple one-line vocals plus lyrics and chord symbols, laid out with titles, credits, extra verses, and so on. I would also do a table of contents, a glossary of Scottish words and phrases, and a discography. After I sent the rough drafts to him in Scotland, his wife, Kathy, an artist and musician herself, would coordinate the graphics and send me back rough layouts so that I could lay out the music and text to fit. After I was finished, she would make up the final page masters and take them to a printer over there. The entire project had to be done in time for an American tour the band was planning for the spring, so I had six weeks to do my part. It seemed like a perfect example of a problem for which desktop publishing would be the solution.

I figured I'd do the notes, lyrics, tempo markings, and chord symbols within the music program and then copy each song, in as large chunks as possible (a page at a time would be nice), and paste it into the page-layout program. There I would arrange the music on the page to accommodate Kathy's graphics. Piece of cake.

THE MUSIC SOFTWARE

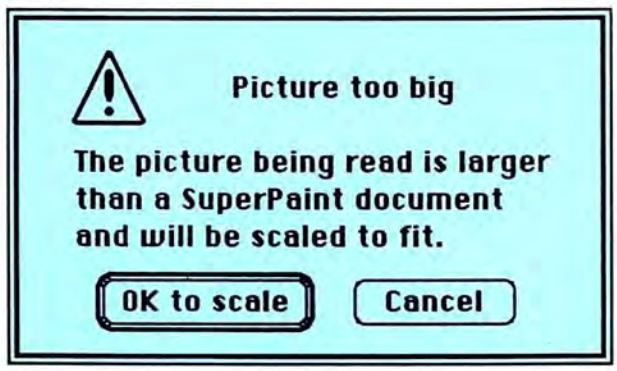
The first task was to find the right music software. It had to be able to export data as text in Sonata font and/or as QuickDraw objects — never as bit maps. And it had to give me complete control over the placement of the notes within each measure, the measures on the page, and the text in relation to the notes. There are no hard-and-fast rules for setting music on paper — making it look good is as much of an art as any other kind of graphic design, and so a program that insisted on spacing the notes on the



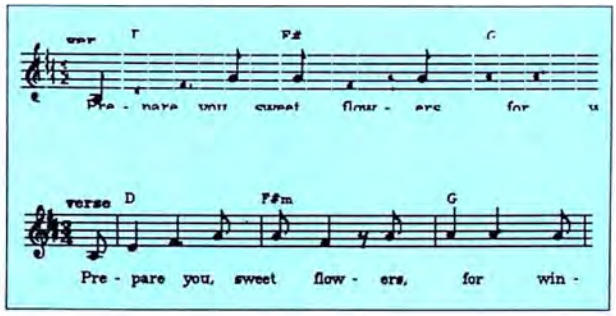
ConcertWare only lets you export objects one screen at a time — no more and no less.



The text-hanging feature in *ConcertWare* is a good idea that doesn't always work.



If you try to paste an object of any size from *DMCS* into *SuperPaint*, you'll get this ominous warning.



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-Sarah

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-Réal

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-Mike

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-John

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MacTree	41.00
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Sidekick 2.0	59.00
Stepping Out	56.00
Suitcase	38.00
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GRAPHICS

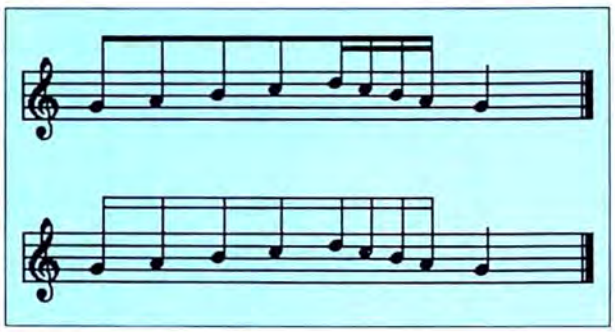
ClickArt Graphics (ea.)	29.00
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Draw It Again Sam	90.00
Cricket Graph	119.00
Freehand	399.00
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MacDraft	159.00
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My Disk Labeler (color)	32.00
PictoGraph	105.00
Picture Base	59.00
Pixel Paint	289.00
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staff its way (that is, strictly according to their duration) would be of little use to me.

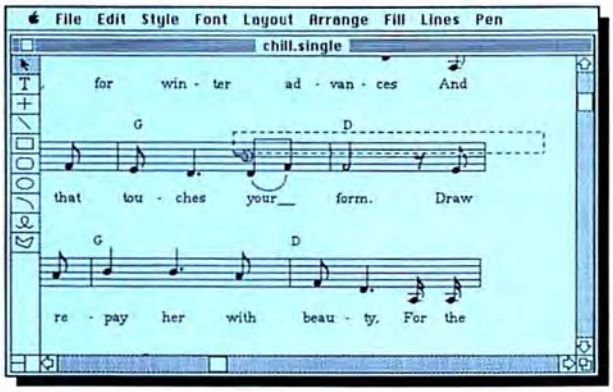
It also had to run under *MultiFinder*, or at least *Switcher*, because I was going to be moving a lot of data via the Clipboard, and I wasn't about to wait for a relaunch every time I changed from the music program to the page-layout program.

Finally, it would be nice if the program accepted MIDI input so I could play the tunes in on a keyboard.

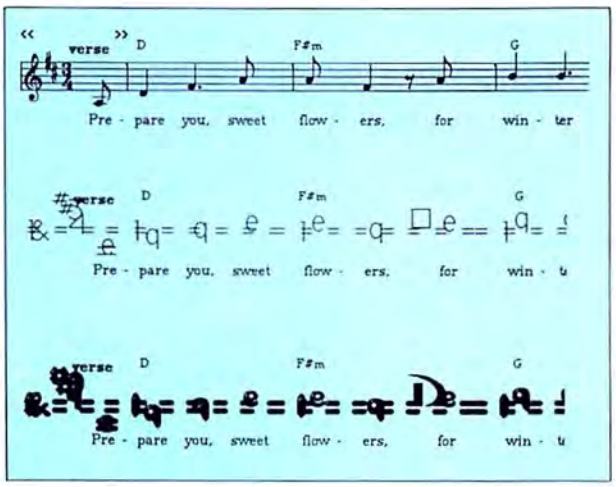
The two leading candidates were *Deluxe Music Construction Set*, from Electronic Arts, and *ConcertWare+ 4.0*, from Great Wave Software. I ruled out *Professional Composer*, from Mark of the Unicorn, because it uses a combination of Adobe's Sonata and its own Musicfont that doesn't export cleanly. It also costs twice as much as the other two combined.



Top: Complex beams as displayed in *DMCS*. Bottom: When imported into *MacDraw*, the beams are too thin and no distinction is made between eighth and sixteenth notes.



Grabbing a beam with the marquee to change its thickness can be like plucking a needle from a haystack. The marquee must be kept flat to avoid picking up any other Sonata text objects.



This line of music looks fine in DMCS . . .

. . . but here's what happens if you paste it into *MacDraw* when Sonata is not installed . . .

. . . or when you have another font, such as Bubbles, with the same font ID.

CONCERTWARE: A FRONT-RUNNER

ConcertWare was initially the favorite because it allows direct real-time MIDI input. *DMCS* can accept files created with a separate MIDI sequencing program (Opcode's *Sequencer* 2.5), but that seemed cumbersome, even under *MultiFinder*.

ConcertWare also has a clever feature by which individual syllables of text can be "hung" onto their respective notes and moved together. I also like its Gap feature, which always makes sure there's enough room for the lyrics between the notes — for example, an eighth note over the word *through* automatically gets more space than one over the word *a*.

ConcertWare had a couple of drawbacks for this project, though. In applications that use Sonata, music notation consists largely of single-character text blocks; each note, rest, accidental, clef, and so on — and sometimes each *part* of a note — is treated as a separate text object. For example, a quarter note with a stem going up is a text block containing the letter *Q*, whereas a quarter note with a stem going down is a Shift-Q and a quarter rest is an Option-Shift-Q. These text objects are laid on top of a staff, which is a larger text block consisting of a string of = signs. Other elements, such as eighth-note beams, first and second endings, and so on, are made up of graphic objects such as lines and rectangles.

ConcertWare doesn't take advantage of the entire Sonata character set. Instead, it constructs notes from the "notehead alone" character (Option-Shift-N), plus one or more vertical lines (graphic objects) for the stems, plus a different character for the flag if there is one. This means that if you need to manipulate a musical note after it has been placed into the layout program, it's a far more complex operation than it would be if the note were a single character.

Another problem is that when exporting data via the Clipboard, *ConcertWare* only lets one screen's worth







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— no more and no less — through at a time. Once you get all these two- or three-bar chunks into the page-layout program, you have to align them carefully, which slows the process down considerably. (You can save whole files as bit maps, but that was no good for my purposes.)

I could have gotten around this limitation with *SuperGlue* — the graphics utility from Solutions that lets you "print" graphic files to disk in object form, where they can be imported into other programs. But that would have added an unwelcome extra layer of complexity.

And I soon discovered more problems — subtle ones but ones that could have turned serious. *ConcertWare*'s automatic text-placement feature is not perfect, and because the notes and words always move together, it's difficult to make small adjustments in one and not the other to make the music look just right. There's also no way to move bar lines directly to stretch or shrink a measure — the only way to do it is to insert or delete spaces among all the notes in the measure, a long process. What finally put *ConcertWare* out of the running was that on the screen it lays the music out in one continuous line. It doesn't perform the musical equivalent of word wrapping until you print.

Whatever time I might have saved with *ConcertWare*'s MIDI input was more than consumed by these extra steps needed to fine tune page layout.

DMCS: THE UNDERDOG

Deluxe Music Construction Set lets you adjust the spacing of notes and measures easily and with a high degree of precision, although these features are miserably documented. *DMCS* also makes it easy to export anything from a single note to a whole song via the Clipboard, and the clefs, key signatures, time signatures, and text go along with the music.

DMCS' inability to handle real-time MIDI input (it has a kludgey non-real-time MIDI input feature) is partly ameliorated by a comprehensive set of Mac-keyboard equivalents that make the process of entering notes much faster than the point-at-the-palette-and-point-at-the-staff method used by other programs.

On the negative side, its text handling is weak. There is no way to align two blocks of text precisely, and getting a text block to appear in bold or italic is a three-mouse operation. I could deal with the text-alignment problem by making sure that all the lyrics for each line were in a single block (although this did lead to slight problems later on), and I abandoned my original idea of putting the chord symbols in bold. Before I could go on, though, I needed to figure out a way around some font conflicts that suddenly cropped up. Actually, I didn't figure out what was *really* going on until long after I'd finished the project.

In contrast to my experience with *ConcertWare*, as I worked with *DMCS*, I discovered more and more

'S-not-a Font

One of the most annoying problems I had to deal with while working on Andy's songbook was font conflicts. A familiar nemesis of many Mac users, font conflicts usually crop up when a typeset document is created with one *System* and then used with another *System*, where one or more of the fonts used in the original document are missing. The result is funny-looking type and altered spacing, as the original typeface is replaced by a substitute and often scaled in the process.

But with Sonata, because it is such a special font, the problem is much worse. Every time I copied a piece of music from *Deluxe Music Construction Set* or *ConcertWare* onto the Clipboard and then pasted it into *MacDraw*, *SuperPaint*, or *PageMaker*, I would get something that was much closer to hieroglyphics than to music.

I talked to many people about the problem, including the technical-support staff at the various programs' publishers, and the answer invariably was, "Oh, you have a font ID problem," but no one could tell me how to fix it. A spokesman for Electronic Arts suggested I install Sonata directly into each of my applications (using Option-Open in *Font/DA Mover*), not just my *System* file, but later a spokesman for Great Wave told me specifically *not* to do that.

I found there were a few ways in which I could work around the problem. For example, when I was going from *DMCS* to *MacDraw*, if I first installed Sonata into *MacDraw*, opened the application, and selected Sonata from its Font menu *before* I put anything onto the Clipboard from *DMCS*, I had a reasonable chance of success. If this sounds like a royal pain, it was.

One thing I tried in desperation, after being told that the problem might be two or more fonts in my *System* with the same ID number, was to flush all the fonts (except the required ones) out of my *System* and reinstall Sonata. It didn't help.

Finally, I broke down and, with the help of an MIT scientist friend who is conversant in these arcane matters, booted up *ResEdit* to see what was going on. We found the problem.

It was so trivial that we were amazed no one else had found it first. It wasn't two fonts with the same ID; it was one font with two IDs.

When Adobe supplies the Sonata laser font, it also supplies bit-map and screen versions in 14, 18, 24, and 36 points. The font ID of a particular typeface (as it shows up in *ResEdit*) is the "font number," multiplied by 128, plus the type size. Sonata's font number, as supplied by Adobe, is 242, so the IDs for the various typefaces are 30990, 30994, 31000, and 31012.

Electronic Arts also supplies Sonata 24 on the *DMCS* program disk, installed in the application itself, so that when someone installs the program on a hard disk, the font automatically goes with it. Author Geoff Brown says that he modified the font slightly to overcome some minor problems in stem placement, but he uses the same ID number as Adobe — 31000.

Great Wave, on the other hand, supplies its own versions of Sonata with *ConcertWare*, in 14-, 20-, and 40-point sizes. Chad Mitchell, one of the authors, says this is because the developers felt the 24-point size was too big for general use (which is a good point) and Adobe's 18-point version was unreadable. (The 40-point version is for high-res printing on an ImageWriter; I'm not sure what the 14-point version is for.) Rather than use the same font number as Adobe, however, Mitchell uses

things to like about it, such as the ability to specify the width (to the pixel) of the printed page and of the distance above and below each staff. *DMCS* can also easily split measures (to accommodate pick-up bars at the beginnings of songs, for example).

But I also discovered more problems. Moving data into the Clipboard was an iffy proposition. When I tried to copy a page of music, about one time in five, only the first line would make it. (Fortunately, a second try was usually successful.)

ALL TOGETHER NOW

The next step was to choose the layout program and make sure it was compatible with the music software. This turned out to be even more of an adventure.

The layout software had to be able to import text and graphics as objects — not as bit maps. It also had to be true WYSIWYG. Any variation between the on-screen and printed positions of a note, rest, bar line, dot, or letter could alter the musical meaning.

Before I did all 25 songs with the music program, I had to choose a compatible layout program. This turned out to be even more of an adventure.

The programs I considered were Aldus' *PageMaker* (Versions 1.2 and 2.0), Silicon Beach's *SuperPaint*, and good ol' *MacDraw*.

PageMaker, which was my first choice, was eliminated the first time I loaded a *DMCS* document into it and printed it on the LaserWriter at my friendly local copy shop. I was warned by a colleague to use the Apple laser driver rather than the Aldus driver when printing with Sonata, unless I wanted my stems to disappear. But I wasn't prepared for the strange things *PageMaker* did with font spacing, to the point where the WYG was no longer close to the WYS. My careful alignment of text and music within *DMCS* went out the window. And because *PageMaker* treats imported groups of objects as a *single* object, there was no way I could go in and correct the spacing of individual words or notes. To make things right, I would have had to go back to *DMCS*, make an educated guess as to how to line things up in that program so they would show up properly in *Pagemaker*, and reimport them. As my grandmother would say, *Feh!*

SuperPaint, the next option, kept telling me that the objects I was trying

a completely different font number — 128. This means the ID for the 20-point size is 16404.

The reason for the discrepancy, according to Mitchell, is that Adobe was supposed to use 128 for Sonata in the first place. The 242, he says, was a number originally registered with Apple for Great Wave's internal use, meaning the company could use it for those special fonts installed in programs such as *KidsTime* and *ConcertWare* (which came out long before Sonata) that were never moved into the *System*.

When Adobe was working on Sonata, Mitchell suggested that the company include certain unusual characters and apparently gave examples in his own font. Somehow, he says, Adobe "appropriated" Great Wave's font number and issued the new font with the wrong number. When Electronic Arts came out with *DMCS* 2.0, which used Sonata, it assigned it this "new" number. But when Great Wave brought out its Sonata-compatible version of *ConcertWare*, Mitchell didn't want to use 242 because, he says, "We've got 40,000 kids out there using *KidsTime*, and we didn't want to mess them up." So Great Wave went with the older font number for its screen version of Sonata.

OK. Now suppose you, Joe Musician, want to try these programs out, so you put *ConcertWare* onto your hard disk (it's not copy-protected). Your *System* now thinks Sonata's font number is 128. Next you want to put *DMCS* on your disk. *DMCS* comes with Sonata 24 already installed (with an ID of 31000, based on the font number 242), but you also want to put it into your *System* so that other programs can get to it. When you do that, however, the typeface gets a new ID, 16408, calculated based on the 128 font number that your *System* has already assigned to Sonata (because you can't have two fonts of the same name in one *System*).

When you launch *DMCS*, the program looks for the ID number for Sonata 24 — that is, 31000. Because the typeface is installed *in the program*, it has to look no further for it. But now if you try to export data created with the program into another application, that other application will go looking for the typeface. The new application will give up and assign a default font — Geneva.

There's another twist. Even if you somehow trick your receiving program into thinking that Sonata 24's ID is 16408 (which is what happens when you open *MacDraw* first and pull down Sonata, as I described earlier), you could still run into trouble.

On my hard disk, there was another typeface in the *System* with that ID number — namely, Bubbles 24! The results were so ridiculous that . . . well, pictures speak louder than words. The scenario that leads to this disaster is not as uncommon as it may sound. Many musicians, recognizing the limitations of one program or the other, buy both (they're not expensive) and have them both installed on their hard disks.

If you do the installation the other way around — if you install *DMCS* first — there's usually no problem. *ConcertWare* doesn't care whether the strange IDs it assigns to Sonata are maintained in the *System* or not because when it looks for a font, it looks for its *name*, not its ID number.

As regards *ConcertWare*, it won't work with *MacDraw* at all because *MacDraw* doesn't recognize a 20-point type size. So it tries to scale it to 24-point, resulting in some very strange spacing errors.

to paste in were too big — even ones as small as a single measure — and would have to be rescaled. Objects such as notes and clefs would show up on the screen only half there, and if I wanted to see all of them, I had to select them, choose SCALE SELECTION from the Edit menu, and rescale them at 200 percent (throwing their placement out of whack). Which left *MacDraw*, which as we all know is slow and sometimes unpredictable. But at least it worked. There were plenty of problems (this was Version 1.9 — the Claris 2.0 revision isn't available yet), but compared to what I had seen so far, they seemed insignificant.

THIN BEAMS AND FAT BITS

First on the problem list were the beams connecting eighth and sixteenth notes. Although they appeared nice and thick in *DMCS*, they showed up in *MacDraw* with a width of one pixel. And in passages in which eighth and sixteenth notes were beamed to each other, *MacDraw* showed them all as sixteenth notes, sporting two beams.

If these objects appeared on the screen all by themselves, they would be easy to fix — select them and change the Pen width and shorten those beams that spill over onto the wrong notes. But each bar of music contains a huge number of different Sonata text objects piled on top of each other, and isolating a single graphic line within that mess is . . . well, talk about finding a needle in a haystack. The solution is to fly a marquee in from the side of the screen, where there are no text objects, making it just high enough to include the beam but not so high that it grabs anything else.

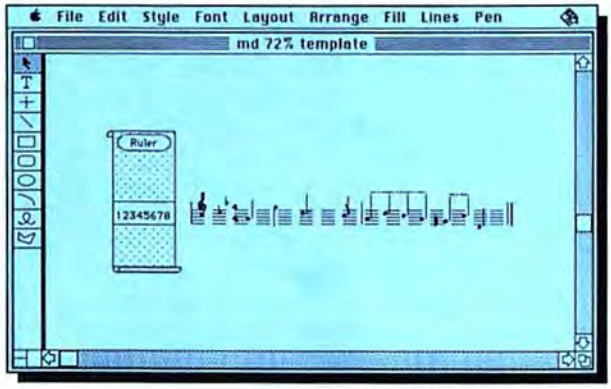
This didn't solve everything, however. After I changed the width of the beams, they came out on the LaserWriter slightly too *long*. I had to go back in again and shorten each beam ever so slightly. *SuperPaint*'s Nudge feature would have been very welcome here.

Another problem cropped up after I got the corrections on my first draft back from Andy in Scotland. In one song I had to change a quarter note to an eighth note and then beam it to another eighth. When eighth notes of different pitches are joined together under a beam, their stems often have different lengths. Sonata accommodates this with characters that are literally "extra pieces" of stem. You lengthen the stem of a note by typing the extra-piece character into a new text block and then lay that text block just above the text block that contains the note. Without a magnifying-glass feature (à la *SuperPaint*), kinks in a composite stem may not be visible on-screen but will be unacceptable when laser-printed.

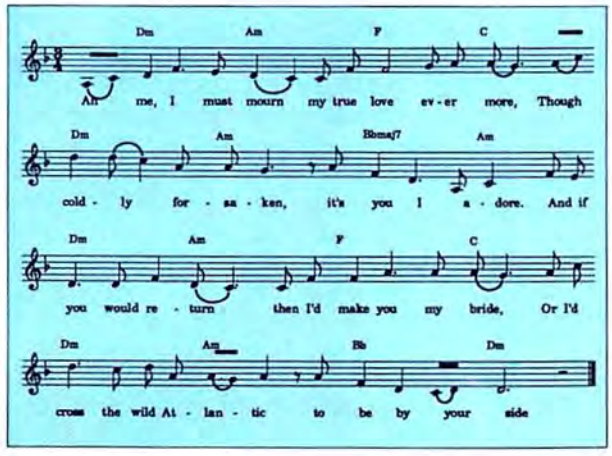
There was also a problem with alignment of text and music — what lined up beautifully on-screen in *DMCS* and *MacDraw* was sometimes a bit off when it came out of the LaserWriter. *DMCS* "hangs" text onto the beginning of each measure (another undocumented feature), so long text blocks can start to fall out of synch. Fixing the problem is merely a question of inserting or deleting spaces at the appropriate places in the line and running the document through the printer again. *MacDraw* communicates quickly with the LaserWriter, so this style of trial-and-error correction wasn't too hard to take.

But the major drawback to using *MacDraw* was that it's slow. Really slow. In Reduce to Fit mode, repainting a screen after a single operation, no matter how minor, could take 20 seconds or more. Selecting blocks of data seemed to take an eternity. Even proofreading was a drag. I got used to working in the largest magnification scale, which meant that I was able to look at only a small portion of the document at a time, but at least it repainted itself relatively quickly.

There was, however, one significant advantage to working with *MacDraw* that I did not discover until the project was well underway. All music programs, including *DMCS*, print in one size. *DMCS* uses Sonata 24, which is a little too big for professional-looking output. You can, of course, specify a reduction factor when printing with a LaserWriter, and the program lets you



Pasting from *ConcertWare* into *MacDraw* gives this result because *MacDraw* doesn't recognize *ConcertWare*'s 20-point version of the Sonata font . . .



Exporting *DMCS* screens into *PageMaker* threw my carefully aligned text and notation out of tune.

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set a page size wider than normal, so you can more or less fill up such a reduced page. In *SuperPaint* or *PageMaker*, you run into trouble when you try to import and scale down one of these oversized *DMCS* pages.

With *MacDraw,* however, you can import a document of any size you like, and the program will, without so much as a grunt, create extra adjacent blank pages to fit all of it on. Then you can print at an appropriate reduction factor, and everything will fit on one sheet of paper. For Andy's book, I generated the music in *DMCS* on a page 723 pixels wide (the default setting is 556 pixels) and reduced it to 72 percent. This gave the music a professional and uncluttered appearance and also allowed far more of it to appear on the page than if I hadn't reduced it.

The results are now available to the public, and the book is being distributed in this country by Music Sales Corporation. Andy and Kathy were mightily pleased, and we're all hoping that someday there'll be an *Andy M. Stewart Songbook, Volume II.*

WE CAN'T GO ON LIKE THIS

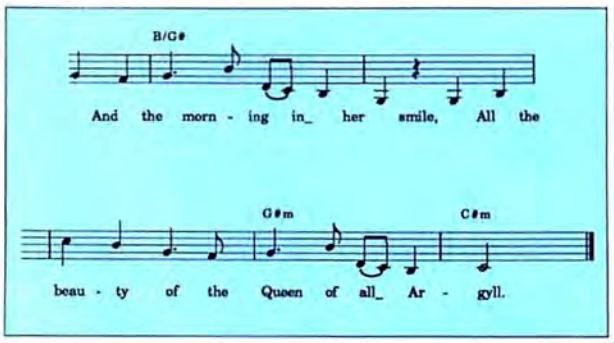
The lesson to be learned from all this is that in music-notation software, things are seldom what they seem. Vague assurances to the contrary on the part of the publishers, nothing works as it should. (Later experiments showed that although *DMCS* had serious problems working with *SuperPaint*, *ConcertWare* actually behaved itself rather well — conversely, *DMCS* worked alright with *MacDraw*, whereas *ConcertWare* was totally incompatible.)

I was able to finish the job I started through a combination of perseverance and luck. I couldn't have done it without access to a wide variety of software and a LaserWriter or if the music had been even a little more complex. If I'd been asked to do a symphony, an opera, or even a piano-vocal sheet, I would still be tearing my hair out.

But the most important, and the saddest, thing I learned from all this is that the creators of music software, authors and publishers alike, are too isolated.

When I spoke to the authors of *ConcertWare* and *DMCS*, they were only dimly aware that there was any trouble getting their programs to work with complementary applications, and each was basically ignorant of the other's product. You can bet if these guys were designing business software, they'd know the competition backward and forward.

Most Macintosh software gets better because developers build on previous generations' work — both their own and their competitors'. As I write, several new high-level music-notation programs are about to come to market. They promise to be fast, intelligent, powerful, and expensive. But if their designers aren't careful about how they deal with the outside world, and if they impose arbitrary and unnecessary limits on how musicians can use the programs, then they will have advanced the cause of desktop music publishing very little indeed.



In Sonata, note stems are often built up from little stem segments. Without a magnifying-glass feature, the only way to avoid jagged stems is by trial and error.



In the end, everything fell into place, but not before I discovered it's a jingle out there.

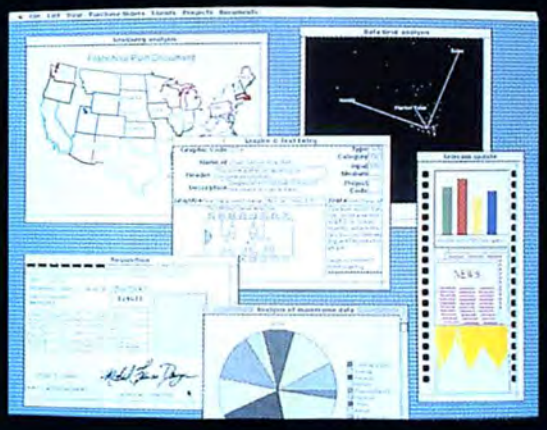
PAUL D. LEHRMAN IS A MIDI MUSICIAN WHO, GIVEN THE NUMBER OF PLUGS HE MANAGED TO SNEAK INTO THIS ARTICLE, NEEDS NO INTRODUCTION. HE DOES, HOWEVER, WISH TO THANK JIM HU AND JEFF WILLIAMS FOR ASSISTANCE IN THE PREPARATION OF THIS ARTICLE.

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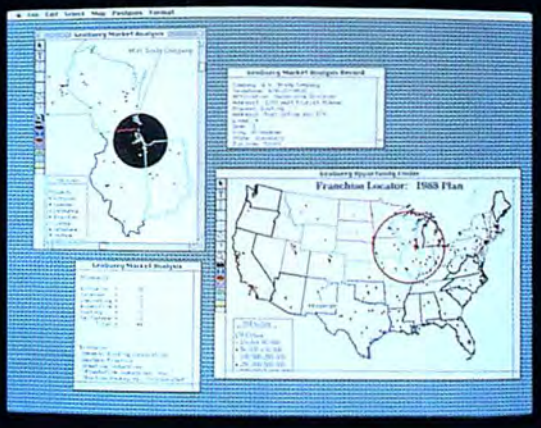
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After the Crash

If disaster strikes, having the right tools and knowing the right techniques will speed the recovery of your disks and files.

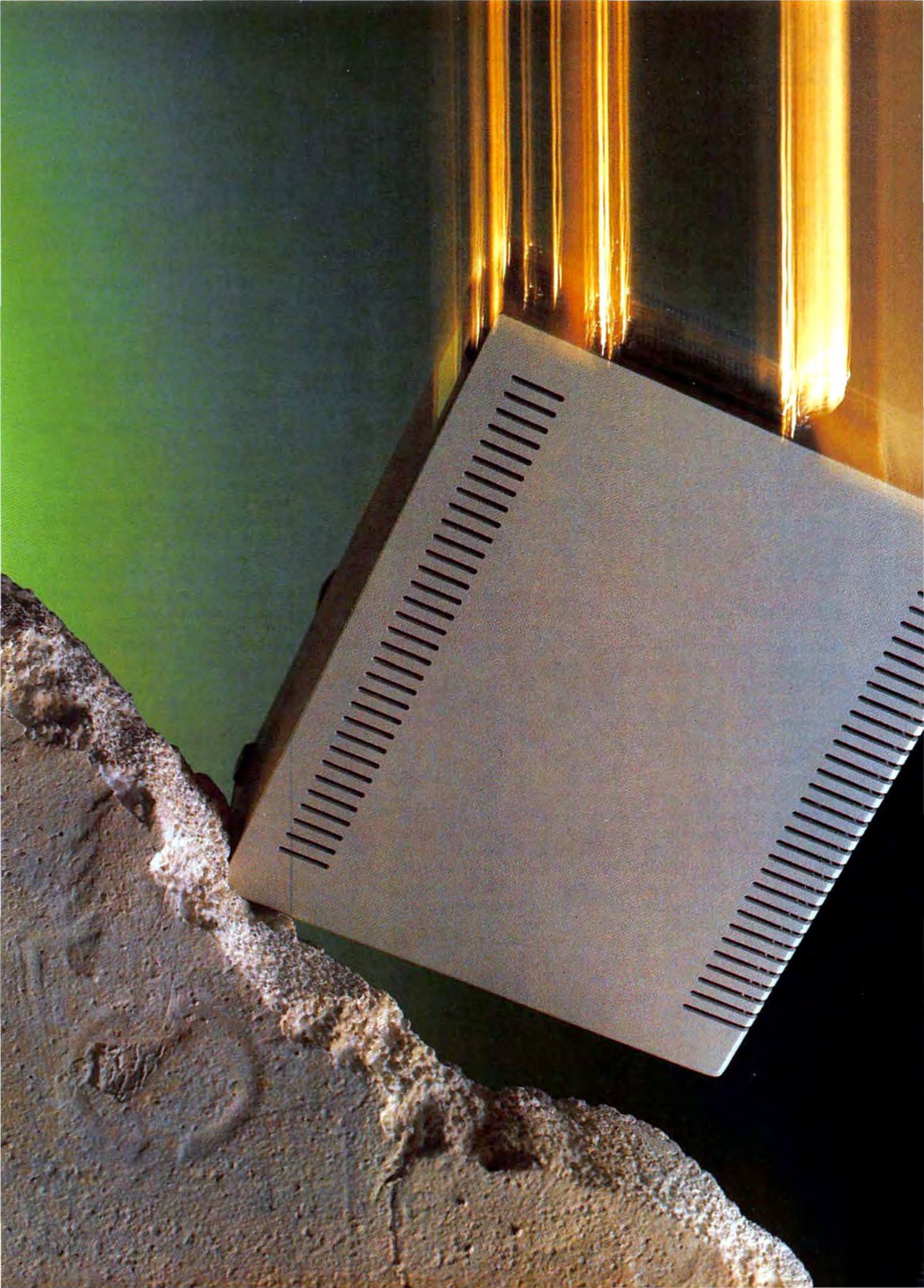
If you use a Macintosh, sooner or later you will be faced with the problem of a damaged (or unreadable) file or, worse, an entire disk. The symptoms are many and varied. Sometimes a file refuses to open and you get a dialog box stating as much. Or you'll put a disk in and the Mac will spit it out and tell you that it doesn't think it's a Mac disk. Or a disk (hard or floppy) that you used to be able to start up from simply refuses to work.

The fastest and easiest way to recover from any of the above is to use a back-up copy of the file or disk. The main problem with that solution is that the vast majority of us do not back up regularly and even if we do, the most recent back-up might not be recent enough. For example, I try to back up the data on every hard disk I use at least weekly (and certainly before every trip — even those of only a day or two; goblins sometimes attack my hard disks while I'm away). Still, while writing this article, I lost a day's work when the Mac decided the disk that the manuscript was on was unreadable. While the bulk of the manuscript was on another disk, the most recent portion wasn't. I tried the techniques in this article, but although they work more than they don't, they didn't help.

That's the first and maybe most important rule of recovering Mac disks and files. Sometimes you can't. You have to know when you've reached the point of no recovery. All that's left at that point is to recreate the material. The point of no recovery is either after

BY STEVEN BOBKER

MEL LINDSTROM



you have tried every tool in your arsenal at least once or the time cost of rebuilding the disk or file is less than the time cost of trying to recover the disk. For example, if your hard disk has little data and lots of applications, it is usually quicker to reload the System software and applications from master disks (I'm assuming you own all the software you use), rather than spending a lot of time recovering (or failing to recover) the whole hard disk. Hopefully the data will be easy to rebuild.

Still, the time is going to come when there will be no back-up nor any way to rebuild your material. Recovery is the only solution. Here's the best way to go about it. Start by isolating the type of problem you have: (1) an unbootable or unreadable floppy disk; (2) a hard disk that won't boot or mount; or (3) a file or files that can't be used or read.

WHEN A FLOPPY FLOPS

We'll start with floppy problems. The normal symptom is a dialog box that informs you that the disk either isn't a Macintosh disk or is damaged. You are asked if you want to INITIALIZE the disk. You *never* want to select that option as it permanently destroys any and all data on the disk.

Sometimes you'll be trying to start up and be faced with either a gray screen with a disk icon that has a flashing X in it or a black screen with a sad Mac. Both of these conditions are symptomatic of trying to boot with a disk that doesn't have the necessary System software on it. If either of these situations occurs, shut the Mac off and try again with one of your Systems Tools disks — they come with the Mac when you buy it. If that works, you should then be able to insert and use the original disk. If that disk still doesn't work, follow these steps.

Start by ejecting and reinserting the damaged disk — that's just to be sure the problem is real and wasn't caused by a disk door sticking or some other minor error. If that fails, your first real step is to eject the disk by clicking on the appropriate button. Lock the disk by sliding the little tab in the upper right corner so you can see light through the hole. Then use a non-*Finder* copying tool like *Copy II Mac* or *Mac Zap* to make a sector copy of the whole disk. If your copier allows you to make a bit copy, don't. Make the sector copy; a bit-by-bit copy, while sounding more faithful, only copies the damage to the new disk and you'll end up with a disk as useless as the original. Try out the copy. This simple routine works surprisingly often.

> Reading the manuals for recovery and extraction tools is absolutely mandatory. None are graced with elegant interfaces.

If that fails, the next step is to get into the disk through some back-door method (all disks have back doors) to extract and save any undamaged files that might be left. The best tools for this are *Disk First Aid, Mac Zap* (soon to be repackaged and republished by Turner-Hall), *Mac Tools,* and *1stAid Kit.* These are not simple tools, but they are powerful. They vary in their power and in their ability to extract files from damaged disks. Unfortunately, there's no way to know or predict which tool will work best on any particular disk. Some earlier versions of these tools do not work on HFS disks, so be sure that you have the latest versions.

Reading the manuals for recovery and extraction tools is absolutely mandatory. None are graced with elegant interfaces. (In fact, this group of tools has the most crowded, non-intuitive interfaces you're likely to see.) And their power has a cost; none is easy to use. In many cases, you need to know the types and creators of the files you are trying to recover. While that knowledge is somewhat arcane, the manuals do a passable job of telling you how to find the necessary codes. Some provide extensive lists to make things easier. The best in this regard is *1stAid Kit,* whose list is complete enough to make the product worthwhile even if you prefer to use another tool.

If these tools fail, the disk is unrecoverable. Don't erase it and reuse it; toss it out! Whatever happened once could happen again; and if you're twice burned by the same bit of plastic and metal, you have only yourself to blame.

Sometimes during the process, miracles will happen. The disk will suddenly appear on the desktop or the files will somehow appear in a list. Don't even stop to take a breath if that happens (you can be thankful later). Just copy everything to the blank, already initialized disk you have waiting. You may have gotten very lucky, and that damaged disk may have been read for the last time. Don't count on ever being around to read it again.

If you do recover a disk, the very first thing to do is BACK IT UP! It's not likely, but there may be a corrupt file on the disk, and it might decide to go on vacation again at any time.

WHEN A HARD DISK GOES SOFT

Unusable hard disks usually have the look and feel of a major disaster, simply because they hold so much material. There are far more problems that can strike them, and recovery is often problematic. The size and variety of hard disks precludes one set of tools being useful in all, or even most, cases.

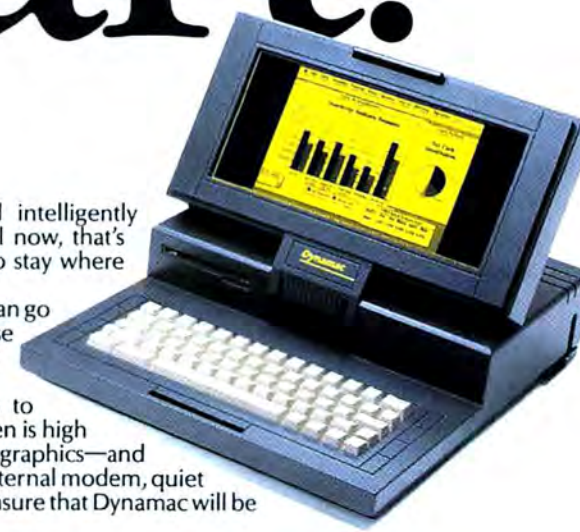
Full recovery can be extremely time consuming. However, in many cases the first few steps of the following procedure will let you at least get at the files on the disk.

As always, the best solution is to have an up-to-date back-up ready to go. If you don't, shame on you. But hold the pity until you determine what the problem is.

Is the disk normally a start-up disk? If so, what happens when you try to start up? A gray screen with an X flashing in the center? A black screen with a sad Mac and some strange little numbers? A *System* crash?

The gray screen is a good sign. It

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likely means the *System* somehow trashed itself or simply got lost (really; the System folder is called the blessed folder and if it somehow gets unblessed, the disk won't boot). You should be able to simply recover from this situation.

Start by shutting the Mac off. Then insert a floppy that you know has a good *System* on it. One of the Apple System Tools disks is an excellent choice. Turn the Mac on, and it will start up from the floppy. Look at the upper right corner. Hopefully you'll see the icon for your hard disk right under the floppy icon. If that occurs, take whatever time you need and, at the very least, back up all your data NOW. (Don't forget game applications that have data built into them!)

Check your System folder. If you are running the most current System software, the System folder will have a small icon on it. If it did before and it doesn't now, you may have multiple copies of the *System* on your disk and the software may be somewhat confused. Drag the *System* and *Finder* to the desktop, then drag them back to the original folder. That should bless (or rebless) it.

The next step is to see if you have multiple copies of the *System* file on the disk. Use a file finder like *DiskTop, Find File,* or *Eureka,* or an application like *MacTree.* If you find more than one *System* file, get rid of all the extras. Keep the original, the one in the *System* folder. That should solve the problem. If you've completed your back-up, you can select RESTART from the Special menu.

If you still have repeated *System* crashes, it might be necessary to replace the *System.* Drag-copy the *System* and *Finder* from the disk you started up with (the floppy) to the System Folder of the hard disk. Allow the copy to replace the files of the same name already in the folder. Then RESTART. If the *System* on the hard disk had become corrupted, this procedure will fix it and put you back in business. If you don't use *Suitcase* or *Font/DA Juggler,* you'll have to reinstall any special fonts and DAs you use.

A black screen with a sad Mac can simply indicate a SCSI ID conflict if you have two or more SCSI devices attached or a much more serious (and possibly hardware-related) problem. If you get the black screen, turn off the Mac and disconnect all SCSI devices attached except the start-up hard disk. You may need to add or remove an external terminator; check the disk's manual about that. While the need for external terminators has become rare, some drives still require them. Try to start up again. If the process works flawlessly, you'll need to check the SCSI IDs of your equipment and modify any that have numbers already in use. Remember that the device with the highest number boots first, so set all the other IDs lower than that of your hard disk.

If the hard disk doesn't have a System on it or isn't the start-up disk, you can either be faced with dreaded "This disk is damaged" dialog or simply with no disk at all (technically, a refusal to mount). Both situations are always serious.

It's not always so simple to change IDs, although it should be. Some SCSI drives and devices (like plotters and laser printers) allow the user to easily change the ID, either with supplied software or via a mechanical switch. Others require opening cases and moving tiny jumpers. Some simply come preset and can't be changed. If you have any in that last class, consider donating them to charity or a good scrapyard and getting new equipment.

If you're still faced with a sad Mac and are sure the cable between the hard disk and the Mac is connected, there's the real possibility of a hardware problem. Contact your dealer or manufacturer to see what service is available. Manufacturers sometimes have special facilities for extracting material from otherwise inaccessible hard disks. However, the process isn't quick, and, if you aren't covered by a warranty, it could be very expensive. (Back-up software is looking cheaper and cheaper, isn't it?)

If that wasn't the problem and the disk still won't boot, the most time- and cost-effective solution is to give up, reinitialize, or reformat the drive (using the manufacturer supplied software) and reload applications and data from your back-up. Don't reload the System folder, however. You should rebuild that from scratch.

If the hard disk doesn't have a *System* on it or isn't the start-up disk, you can either be faced with dreaded "This disk is damaged" dialog or simply with no disk at all (technically, a refusal to mount). Both situations are always serious. A *System* crash at this point is a very bad sign and most often means a hopeless case. Still, there are a few things worth trying.

Start by launching your disk's manager or utility software. If a disk doesn't come with that kind of software, you shouldn't buy it. Always keep a copy of it on your start-up disk.

These programs vary widely in what they do and how well they do it. See if the program will recognize or acknowledge the presence of the bad disk. If so, run whatever diagnostics are available and try to have the program mount the disk. If you get it mounted, back it up immediately. Have the manager reinstall the SCSI driver, but under no circumstances should you at this point reinitialize, reformat, or erase anything.

If the manager software is able to mount the disk (and you've backed it up), run Apple's *Disk First Aid* program. It can fix some small (and not so small) problems. Running can only help; it can't do any harm.

If you're still having problems and are running on an SE or a Mac II, try resetting its parameter RAM



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(PRAM) by booting from a Systems Tools disk and then holding down the Option, Command, and Shift keys while selecting the *Control Panel* DA.

A black screen with a sad Mac can simply indicate a SCSI ID conflict if you have two or more SCSI devices attached or a much more serious problem.

(If you use *Suitcase,* holding down the Option key reduces the Apple menu to *Suitcase.* Select it, then select *Control Panel,* holding the modifier keys down the whole time.) Then simply agree to the dialog box. The PRAM is a special area in the Mac that holds the basic settings. Sometimes it corrupts. Resetting it will cause it to revert to its default values and let you get back into your hard disk.

If everything so far has failed to let you get at your files, you might as well try the file extraction tools that are used with floppies. They are slow and, if they work at all, often produce totally outrageous (and impossible to deal with) numbers of undifferentiated files. If you know the sizes of the files you are looking for, you might be able to find all files of similar size and set types and creators and actually get to them. Having tried this solution once, I'll never try it again. However, if your life hinges on recovering a particular file, it might work for you.

GOOD ADVICE: BE PREPARED

Disk recovery will be far quicker and easier if you have the tools on hand and ready to go. Make up a set of disks as follows: One disk should have your current *System* and *Finder* on it. If your *System* is too big to fit on a floppy, I strongly urge you to acquire either *Suitcase* or *Font/DA Juggler* and reduce your *System* size to manageable proportions. This disk will be your first choice start-up disk and you'll use it to copy the *System* and *Finder.* If there's additional room on the disk, add *Disk First Aid* or your hard disk manager software.

Make a copy of this disk. On the copy set either *Disk First Aid* or your manager software as the SET STARTUP application. Mark the two disks clearly.

Then make a working copy of each of your recovery tools disks. Most of these come with *Systems* already on them. Finally, put as many of your recovery tools as possible on one 800K disk (but leave all the System software off).

Now make a duplicate set of all of these disks. Put each set in a separate envelope or box and store them apart from each other. One set should be stored apart from all your disks. Remember where you put them and hope that you never have to use them.

In the second part of this article, I'll tell you how to try to save damaged individual files and talk about other tools and techniques that can help get you out of trouble.

STEVEN BOBKER IS MACUSER'S CHIEF SCIENTIST AND WISHES HE HAD FAR LESS EXPERIENCE IN RECOVERING DISKS AND FILES.

Where to Find the Programs

Copy II Mac, MacTools
(*MacTools* is included on the *Copy II Mac* and as a separate program)
Central Point Software
9700 SW Capitol Highway
Portland, OR 97219
(813) 884-3092

DiskTop
CE Software
P.O. Box 65580
West Des Moines, IA 50265
(515) 224-1995

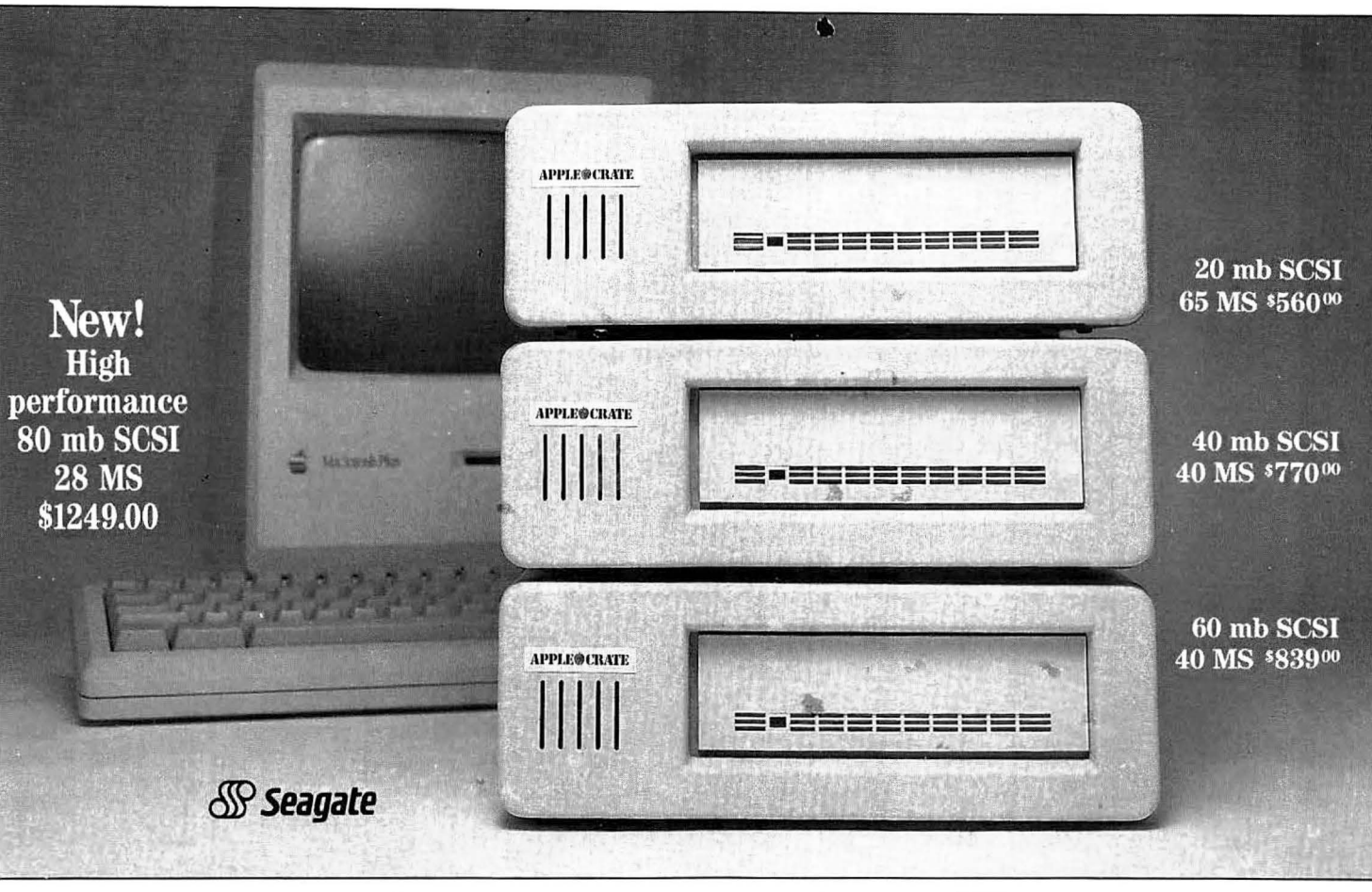
MacTree
Software Research Technology
22901 Mill Creek Drive
Laguna Hills, CA 92653
(800) 824-5537; in CA (714) 472-0474

Mac Zap
MicroAnalyst
2505 Roxmoor
Austin, TX 78723
(512) 926-4527

Eureka
(Included with MacBottom 45 SCSI and Internal Modem)
Personal Computer Peripherals
6204 Benjamin Rd.
Tampa, FL 33634
(813) 884-3092

1stAid Kit
1st Aid Software
42 Radnor Rd.
Boston, MA 02135
(617) 783-7118

Disk First Aid
(Included in Apple's *System Update* 5.0)
Apple Computer
20525 Mariani Ave.
Cupertino, CA 95014
(408) 996-1010



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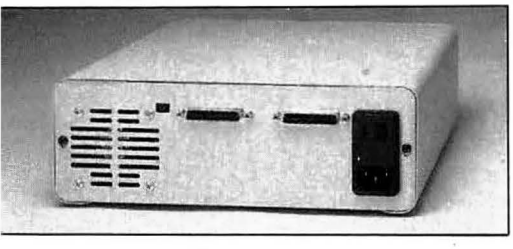
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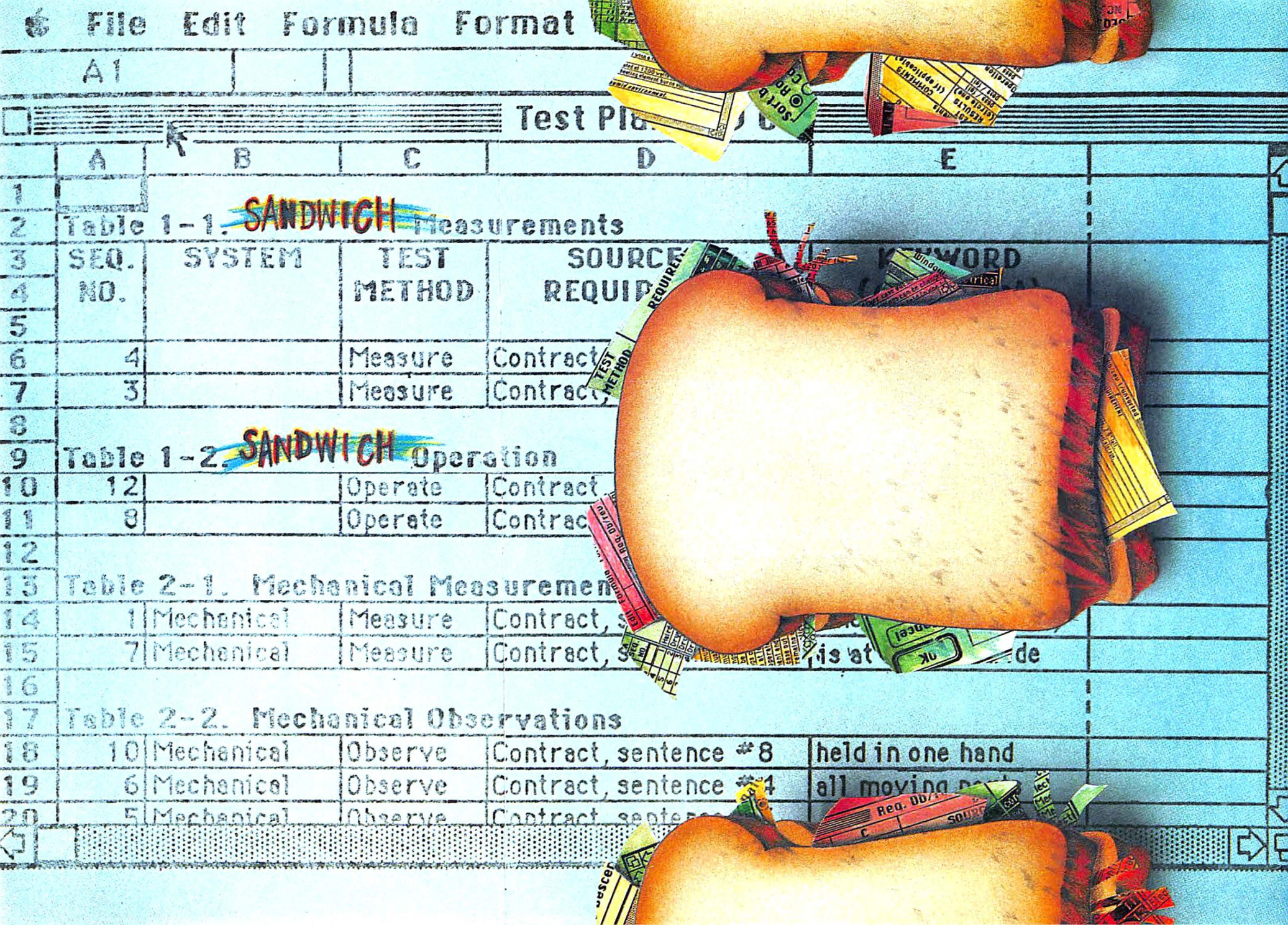
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File Edit Formula Format
A1
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Table 1-1. SANDWICH Measurements
SEQ. NO.
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4
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3
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Contract
Table 1-2. SANDWICH Operation
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Contract
8
Operate
Contrac
Table 2-1. Mechanical Measuremen
1 Mechanical
Measure
Contract, s
7 Mechanical
Measure
Contract, S
Table 2-2. Mechanical Observations
10 Mechanical
Observe
Contract, sentence #8
held in one hand
6 Mechanical
Observe
Contract, sentence #4
5 Mechanical
Observe

Projects Between the Sheets

Everyone knows Microsoft Excel is a power spreadsheet. As a database manager, it can also improve project management and product testing.

BY SANDRA ELAM

Why are so many projects overdue and overbudget? All too often it's because project requirements are out of control, which inevitably causes schedule delays and cost overruns. Using *Excel*, there's a simple way to get a grip on any project — no matter how large or complex. The technique involves using a project-requirements database. With this database, you can avoid wasting time and money on your next project, easily track new or changed requirements, and clearly show through testing that your product meets all specifications.

Excel lets you automate the requirement-tracking process so you know exactly what is required on each project at any moment (often an impossible task when tracking is done manually). In addition, managers can automatically generate test plans that contain each project requirement. Because each line in the test plan is cross-referenced to the database, requirements never slip through the cracks.

Recently I created a 900-line project-requirements database in *Excel* to track every requirement for a $5 million engineering project. The database was easy to set up and update and proved invaluable to the project manager during the design and testing phases of the project. You can use this kind of database to manage any business task involving a project that must be completed. Whether you're designing a car, building a subway system, or writing a procedure to test a new hair dryer, the need for a comprehensive set of requirements — neatly categorized, easily sorted — always exists. But you need a database manager to help you organize these requirements.

EXCEL: A DATABASE MANAGER?

Although *Excel* is widely known as *the* power spreadsheet, it's actually a spreadsheet, charting program, and database manager rolled into one. *Excel*'s database manager is often overlooked, however — although it's extremely capable. Because a project-

KEVIN O'SHEA

requirements database could be set up in any database application, why use *Excel?* Well, *Excel*'s database manager is as powerful as many other standalone applications and it's easy to learn. It's especially cost-effective if you already have the program for its spreadsheeting capabilities.

Like many database managers, *Excel* can sort a database by an unlimited number of key categories and can easily find, extract, or delete all records meeting criteria you specify. Entering database information is as simple as entering spreadsheet data — just click on a cell, then start typing. And *Excel* gives you a lot of control over the format of your database, so reports printed on a LaserWriter look great.

If you already use *Excel* as a spreadsheet, you'll find learning the database commands a snap. Unlike some database applications that require you to enter data for each record on a separate form, in *Excel* you enter all data on one worksheet. Instead of displaying just one record at a time, *Excel* displays all records together in a table, which makes it easy to scroll through a database, updating or comparing records. The only drawback to this kind of display arises when you have more than about ten fields in your database (if you're using a standard Mac display). Because you can't set up an entry form to show all the fields on one screen, you have to scroll back and forth across the columns (which can take up several Mac screen widths, depending on how wide each column is). The constant scrolling is somewhat annoying, but if your budget permits, you can alleviate this problem by using a large monitor.

Before I discuss how to set up a project-requirements database, I'll take a quick look at *Excel*'s menus and the specific commands involved in database management.

WHAT'S ON THE MENUS?

The menu bar has eight headings: File, Edit, Formula, Format, Data, Options, Macro, and Window. The database commands are in the Data menu, but you should explore all the menus if you're not already familiar with them. Many of the basic spreadsheet commands are especially useful when you're using *Excel* as a database.

You use the Macro menu to write miniprograms called macros to automate repetitive tasks that you'd nor-

An Extra Pair of Hands

Excel macros let you automate repetitive tasks needed to create and maintain databases. A macro replaces a sequence of keystrokes and mouseclicks with a single command. Like a player piano roll, a macro stores information that — when executed — guides a pair of invisible hands across the keyboard.

Creating macros in *Excel* is easy, once you know the basic steps. *Excel* helps you write macros with the RECORD command, located in the Macro menu. When you play back a RECORDED sequence, *Excel* acts just as if you had typed in that sequence of keystrokes. You can also edit a RECORDED macro to make it more efficient or more broadly applicable.

I created three macros to simplify maintenance of a project requirements database. One makes sorting the database easier, another takes care of renumbering project requirements after you've added new ones, and the last simplifies adding new items to the database.

First, however, you should do a couple of things to your database to prepare it for use with macros. For starters, it helps to shorten the column headings so that more columns fit in a single screen width, so you can better see what you're doing. You should also change the header labels so that all of them are unique and fit in a single row (because *Excel* doesn't recognize two-line database headers). I also put my criteria range at the top of the worksheet, since putting it at the bottom can cause problems as the database range expands.

To build a macro, create a new macro sheet using the NEW command on the File menu. To record the Sort macro, I entered the label Sort into the macro sheet, and used DEFINE NAME to identify that cell as the starting point for the macro called Sort. I also selected Command in the dialog box, and entered the letter *'s'* into the shortcut box. The Sort macro can then be started by using RUN from the Macro menu (and selecting Sort from the subsequent dialog box) or by simply executing an Option-Command-S.

Next, I chose SET RECORDER from the Macro menu, and activated my database worksheet. After choosing START RECORDER from the Macro menu, all keystrokes and mouseclicks are recorded onto the Macro sheet (until STOP RECORDER is selected).

I recorded the following steps: First, I selected everything in the database range except the column labels. Next, I chose SORT from the Data menu and did a sort. Finally, I stopped the recorder.

Often, you can use a recorded macro "as is" but, in this case, I wanted a more generic macro. I reactivated the macro sheet and clicked on the cell containing the `=SELECT...` formula.

I changed the formula to read as follows:

```
=SELECT(INDEX(!Database,2,0):
INDEX(!Database,ROWS(!Database),0)).
```

This statement makes use of a few of *Excel*'s more powerful non-recordable functions.

The INDEX function selects the particular row, column, or cell specified by the arguments that follow in parentheses. In English, the macro statement reads: "Select the area from the second row and first column of the area called 'Database' to the last row and first column of the same 'Database' area." The name Database was automatically defined when you used the SET DATABASE command. Using this generic name lets the macro adjust automatically, as the database range expands and contracts. Similarly, the "!" in this syntax refers to the active worksheet, regardless of its name.

I made the sort statement generic by changing it to `=SORT?()`. This syntax prompts the user with the standard sort dialog box. Finally, I had the sort macro invoke a SAVE AS (to make sure that my old data won't accidentally get "clobbered") by manually inserting the following statement: `=SAVE.AS?("Enter a new file name.")`.

The ReNumber macro chooses the area from the first cell of the second row to the first cell of the last row of the database using the INDEX function. Having done this, it enters a 1 into the active (top) cell in this column, and uses the SERIES command from the Data menu to assign sequential numbers down the

mally perform manually. You create a macro by having the Mac record a sequence of actions (choosing a cell or command, scrolling, opening a file, and so on) you perform. Once the Mac has recorded the sequence, you just invoke the macro and that sequence of actions is recreated. You can also fine-tune a macro (or create it from scratch) using *Excel*'s macro programming language.

You don't need to know how to write a macro to set up a database, although a good macro written for your particular application can automate many database functions (such as sorting, finding, extracting, or deleting records). The sidebar "An Extra Pair of Hands" goes into more detail on the hows and whys of macros.

The UNDO command on the Edit menu is different from what you'd expect. *Excel* cannot undo some database commands, so be careful when sorting or deleting records. Because of UNDO's limited capability, it's a good idea to save your database under a new name before you do anything drastic to it (more on this later).

In creating a database, you'll be doing a lot of data manipulation, so for maximum efficiency you should learn several keyboard commands by heart: Command-X for CUT, Command-C for COPY, and Command-V for PASTE. When cutting, copying, or pasting rows in a database, you must remember to select the entire row (by clicking on the row number along the left margin), not just a portion of it. This is because all information in one row is part of the same record and each record must stay intact or your database will be scrambled.

Most of the commands in the Formula menu are used to create spreadsheets, not databases, but there are two you'll use often: SELECT LAST CELL and SHOW ACTIVE CELL. SELECT LAST CELL lets you jump to the last cell in your database, saving time and frustration. Imagine the agony of scrolling to the bottom of a 1000-line database!

Excel defines the "last cell" in your database as the intersection of the last row and last column that contains a cell with data or formatting information — *not* as the last cell into which you've entered data. If you ever get an Out of Memory box when you think you shouldn't, choose the SELECT LAST CELL command. If *Excel* jumps way beyond the last cell containing data,

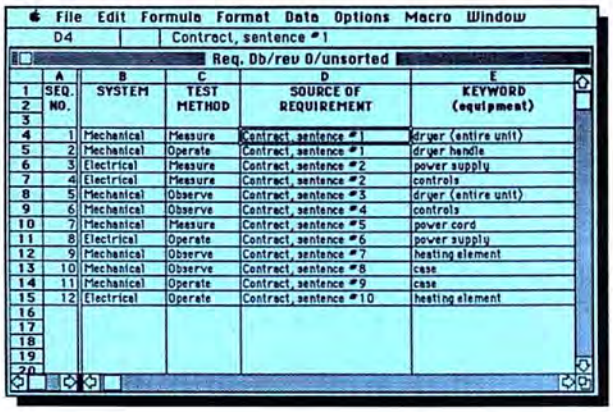
column. The macro also restores the active cell or range to whatever it was before you invoked the macro. It does this by creating a temporary name (BookMark) associated with the range that's active when the macro is first invoked. The command FORMULA.GOTO(!BookMark) restores it as the active range when the macro is done renumbering.

The AddRow macro adds a new row to the database, based on the location of the active cell just before the macro is invoked. The macro has to be smart enough to know whether you're adding to the middle or to the end of the database. Adding a row to the middle is easy, but, if you want to add to the bottom of the database, you need to reset the database range. An IF command checks which of two subroutines (AddBottom or DoInsert) is appropriate. In either case, the AddRow macro formats the new row as bold and italic.

Finally, it executes the ReNumber macro as a command within the AddRow macro.

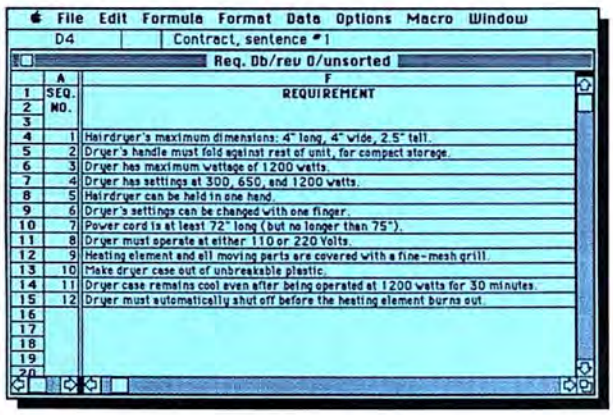
— Louis E. Benjamin, Jr.

	A	B
1	**DATABASE MACROS**	
2	Labels/Commands	**Comments**
3	**Sort/s**	Starts with Option-Command-s.
4	=SELECT(INDEX(!Database,2,0):INDEX(!Database,ROWS(!Database),0))	Select the sort range.
5	=SORT?()	Sort, with prompt message.
6	=SAVE.AS?("Enter a new file name.")	Save the new sort.
7	=RETURN()	Done.
8		
9	**ReNumber/r**	Starts with Option-Command-r.
10	=DEFINE.NAME("BookMark")	Remember where you were.
11	=SELECT(INDEX(!Database,2,1):INDEX(!Database,ROWS(!Database),1))	Select first column of the database, omitting title row.
12	=FORMULA(1)	Put a 1 in the active cell.
13	=DATA.SERIES(2,1,,1,)	Series command (from Data menu) generates sequence #s.
14	=FORMULA.GOTO(!BookMark)	Re-select area that was active before macro began.
15	=DELETE.NAME("BookMark")	Get rid of temporary name.
16	=RETURN()	Done.
17		
18	**AddRow/a**	Starts with Option-Command-a.
19	=ROW(ACTIVE.CELL())	Note the row number of the active cell, for use in next line.
20	=IF(A19>ROW(INDEX(!Database,ROWS(!Database),0)),AddBottom(),DoInsert())	If it's below last database row, do AddBottom, else DoInsert.
21	=STYLE(TRUE,TRUE)	Set format to Bold+Italic.
22	=ReNumber()	Re-do the sequence numbers.
23	=RETURN()	Done.
24		
25	**AddBottom**	Supports AddRow.
26	=SELECT(INDEX(!Database,1,1):OFFSET(INDEX(!Database,ROWS(!Database),COLUMNS(!Database)),1,0))	Select area 1 row deeper than current database.
27	=SET.DATABASE()	Set the new database range.
28	=SELECT(INDEX(!Database,ROWS(!Database),0))	Now select the bottom row.
29	=RETURN()	Done, return to AddRow.
30		
31	**DoInsert**	Also called by AddRow.
32	=SELECT("r")	Highlight the entire row of the active cell.
33	=INSERT()	Insert — automatically shifts cells down.
34	=RETURN()	Done, return to AddRow.



	A	B	C	D	E
1	SEQ. NO.	SYSTEM	TEST METHOD	SOURCE OF REQUIREMENT	KEYWORD (equipment)
2					
3					
4	1	Mechanical	Measure	Contract, sentence #1	dryer (entire unit)
5	2	Mechanical	Operate	Contract, sentence #1	dryer handle
6	3	Electrical	Measure	Contract, sentence #2	power supply
7	4	Electrical	Measure	Contract, sentence #2	controls
8	5	Mechanical	Observe	Contract, sentence #3	dryer (entire unit)
9	6	Mechanical	Observe	Contract, sentence #4	controls
10	7	Mechanical	Measure	Contract, sentence #5	power cord
11	8	Electrical	Operate	Contract, sentence #6	power supply
12	9	Mechanical	Observe	Contract, sentence #7	heating element
13	10	Mechanical	Observe	Contract, sentence #8	case
14	11	Mechanical	Operate	Contract, sentence #9	case
15	12	Electrical	Operate	Contract, sentence #10	heating element
16					
17					
18					
19					
20					

You can create a project-requirements database simply by clicking on cells and typing data in an *Excel* worksheet. Adopt a systematic approach to saving each revision to the database under a new name. Five of the six critical fields are shown here.



	A	F
1	SEQ. NO.	REQUIREMENT
2		
3		
4	1	Hairdryer's maximum dimensions: 4" long, 4" wide, 2.5" tall.
5	2	Dryer's handle must fold against rest of unit, for compact storage.
6	3	Dryer has maximum wattage of 1200 watts.
7	4	Dryer has settings at 300, 650, and 1200 watts.
8	5	Hairdryer can be held in one hand.
9	6	Dryer's settings can be changed with one finger.
10	7	Power cord is at least 72" long (but no longer than 75").
11	8	Dryer must operate at either 110 or 220 Volts.
12	9	Heating element and all moving parts are covered with a fine-mesh grill.
13	10	Make dryer case out of unbreakable plastic.
14	11	Dryer case remains cool even after being operated at 1200 watts for 30 minutes.
15	12	Dryer must automatically shut off before the heating element burns out.
16		
17		
18		
19		
20		

Scrolling reveals the sixth field — the Requirement column. It will probably need a full screen width all for itself. You can use *Excel*'s split-screen capability to keep the Sequence Number column visible, however.

the problem is that a bunch of empty cells have been added to the database, eating up all available memory.

To alleviate this problem, select and cut all empty cells between the last cell containing data and *Excel*'s last cell. Then, save, close, and reopen the database. *Excel* will delete those empty cells from the database, significantly reducing the amount of memory consumed. Your database will save and load faster.

Another command that saves scrolling time is SHOW ACTIVE CELL. Let's say that you click on a cell in row 50 of your database but you need to refer to row 10 for some information. Scroll up to row 10 (without clicking on another cell), find the information you need, then choose SHOW ACTIVE CELL. *Excel* immediately jumps back to the last cell you clicked on (the one in row 50, in this case).

The Format menu contains five commands that determine how *Excel* interprets and displays the data you enter: NUMBER, ALIGNMENT, STYLE, BORDER, and COLUMN WIDTH. Most of these are self-explanatory after a little exploration. In the Number dialog box, you will usually choose the General format. You have to be careful when entering data such as serial numbers or part numbers because *Excel* sometimes automatically reformats numbers. If you enter a part number such as 3-2-88, for instance, *Excel* will think it's a date and will display it as 2-Mar-88. To avoid this, *always* add a "dummy character" such as a pound sign (#) or a space character in front of all data that *Excel* might think is a numeral or date. If you enter the part number as #3-2-88, *Excel* will treat it as text and will not try to reformat it.

WHERE THE ACTION IS

The specific commands you'll need to turn your data into a database are on the Data menu: FIND, EXTRACT, DELETE, SET DATABASE, SET CRITERIA, SORT, and SERIES. First, you have to tell *Excel* what part of your worksheet to consider as a database — you may, for example, use parts of the same worksheet as a spreadsheet, as a scratch pad, and as a holding place for numbers used to generate graphics as well as for your database. You simply select the database portion, including column headings, then select SET DATABASE. After you have done this, you can use the other database commands on this menu. Before you can find, extract, or delete records, you must first specify the criteria that will single out the data records you're interested in. To do this, you set up a CRITERIA RANGE above the first line or below the last line of your database. You copy your column headings into this range and type criteria underneath the proper column headings. The criteria can be text or numeric values, and you can specify an exact value to be matched, a range of acceptable values (using =, <, >, <=, >=, or <> operators), or computed values based on *Excel* formulas. You can also use two wildcard characters when searching for text: A question mark (?) can be used to accept any single character in that position, and an asterisk (*) can represent an indefinite number of characters. Select the entire CRITERIA RANGE, then choose the SET CRITERIA command. Then the FIND, EXTRACT, or DELETE command will act on all records meeting the criteria you specified.

The SORT command leads to a dialog box in which you specify key categories for *Excel* to use when sorting. The SERIES command leads to a dialog box in which you can easily generate a series of numbers (more on these commands later).

WITHOUT EXCEL: RUNNING AMOK

Now that you have a general idea of *Excel*'s database capability, let's create a sample project-requirements database. For our hypothetical project, let's say a company is designing a new hair dryer. The project manager knows the dryer must meet all requirements contained in the contract and pass a rigorous test procedure derived from these requirements. But without a project-requirements database to track each requirement, he has no idea whether each requirement is being implemented as it should be.

The mechanical engineer correctly designs an on/off switch for the hair

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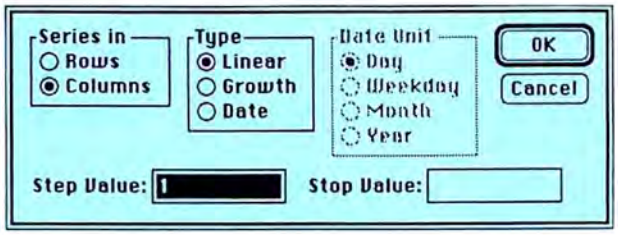
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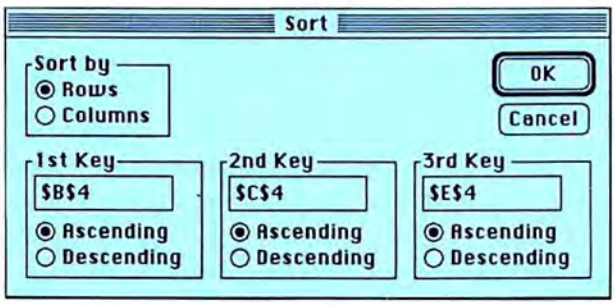
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From the Data menu, choose SERIES to insert a series of numbers automatically into the Sequence Number column. This is much quicker than typing sequence numbers manually.



Also from the Data menu, choose SORT to order the database according to the fields you're interested in at the moment. Here, a nested subsort within a subsort within a sort is shown. The primary key is System, then Test Method, and finally Keyword.

dryer with three wattage settings — 300, 650, and 1200 watts — but the electrical engineer purchases an 800-watt heater instead of a 1200-watt heater. Because requirements were unclear, the company wasted time and money designing the wrong product. Each requirement that slipped through the cracks cost thousands of dollars and months of delay. The company could have avoided confusion, cost overruns, and wasted time by setting up a project-requirements database. Here's how to do it.

WITH EXCEL: RUNNING SMOOTHLY

The first step is to collect the sources for every project requirement. If there's a contract for this project, it probably lists the formal project requirements in a statement of work. Informal requirements can come from anywhere — meetings with your boss, letters from customers, or a stack of Post-it notes. In some cases, you'll make up project requirements yourself.

Next, open a new *Excel* worksheet and start entering data. For the sample database shown in the figures, I set up six columns, or *fields,* namely: Sequence Number, System, Test Method, Source of Requirement, Keyword, and Requirement. Depending on the project, your database may have more fields (for equipment model number, serial number, quantity, or manufacturer, for instance).

Let's say that the only source of requirements for this particular project is a contract consisting of ten sentences. You enter each sentence from the contract in the Requirement column. The first sentence in the contract says: "The new hair dryer to be designed must be no longer than 4 inches overall, must have a maximum width of 4 inches, and must be a maximum of 2.5 inches tall; additionally, the handle of the dryer must fold against the rest of the unit for compact storage."

Sentences such as this often contain more than one requirement, tucking them away behind semicolons. Strip away redundant words. Don't feel obliged to type each sentence in exactly as it appears in the contract. You are trying to glean the essence of the requirement. If a sentence is too long to fit into one cell (which can hold a maximum of 108 characters), it usually contains more than one requirement. Break it into pieces and put each requirement on a separate line in the database. Then you can track each requirement individually.

In the Sequence Number column, you assign a unique number to each requirement. For short databases, you can type sequence numbers in manually, but for databases of more than, say, 20 lines, you should use the SERIES command on the Data menu to insert this sequence — it's fast and easy to use. Select the Sequence Number column, choose SERIES, then click on the OK button. *Excel* automatically inserts a sequence of numbers in the selected column.

Because a different sequence number is used for each requirement, it uniquely identifies that requirement. Sequence numbers are crucial in tracking requirements. They also allow you to cross-reference your contract (or other sources) with your database and the database with your test plan. If you delete a requirement from your database, renumber all sequence numbers from that point on (using the SERIES command); otherwise, gaps in the number sequence will make it seem as if some requirements have been accidentally lost.

In the Source of Requirement column, record where each requirement came from. Knowing the source sentence (or paragraph, conversation, memo, and so on) for each requirement lets you document that each requirement is, in fact, required. When the inevitable happens and you're accused of inventing or distorting requirements, this column is your defense.

The System column identifies each major part of the project (in this case, each system in the hair dryer). Each requirement will eventually be sorted into one of these systems. If you're writing a review of a Macintosh software product instead of designing a hair dryer, this column might contain topic headings. You might have six topic headings: Lead, Features, Bugs, Recommendations, Summary, and Rating. You would assign each idea (that is, requirement) to one of these headings. Just keep in mind that this column must divide your project into major parts, sections, or systems.

In the Keyword column, you choose a word that instantly categorizes the requirement and helps sort the database into a meaningful order. For the sample database, the keyword is a piece of equipment — the part of the hair dryer to which the requirement refers. When designing a product that will eventually be tested, the keyword should *always* be a piece of equipment. On the other hand, if you are writing a Macintosh product review, the Keyword column should contain a

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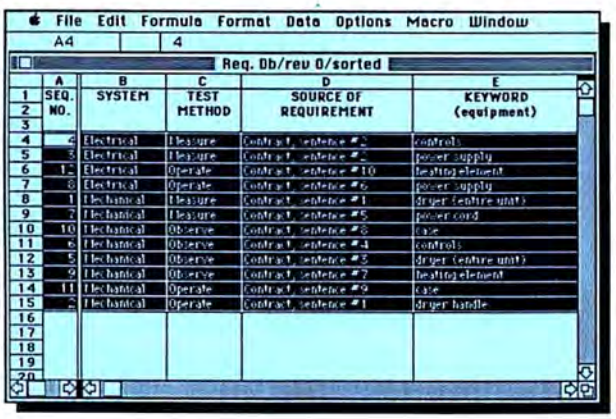
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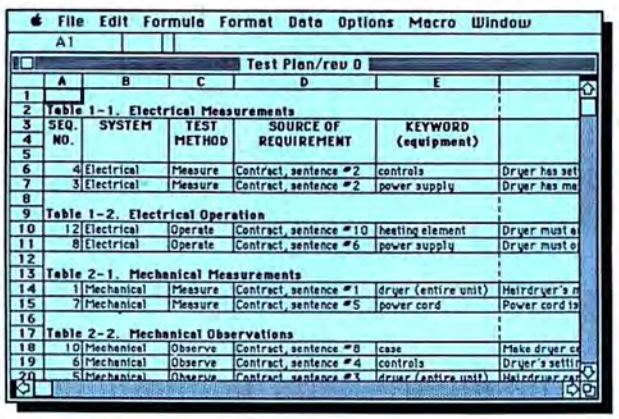
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The database just after sorting. Requirements are now grouped according to System, Test Method, and Keyword. Notice the database has been saved under a new name to distinguish the sorted and unsorted versions.



You can generate a test plan automatically from the sorted database by reformatting and adding a few heading lines.

keyword that summarizes the main idea in each requirement. Because keywords will be sorted into alphabetical order, be sure you use any abbreviations consistently.

Obviously, you only need a Test Method column if you're designing something that will be tested. Nearly all the projects go through a test phase, although it's not always immediately obvious. For the sample database, you categorize each hair dryer requirement according to how it should be tested: by measuring, observing, or operating. If you're writing a software review, Test Method might include editing, proofreading, or having someone else read through the article.

SORTING THINGS OUT

Before sorting, save the database under a new name. As mentioned earlier, *Excel* cannot undo a sort, so if you make a mistake sorting your original database and you haven't saved it under a new name, you're in trouble! Once you've saved the database under a new name, though, any sorting mistakes will not affect your original database — to which you can easily return, if necessary.

The most useful way to organize the sample database is to sort first by System, then by Test Method, and finally by Keyword. To do this, you first select your entire database, choose SET DATABASE, then select the part of your database you want to sort — everything *except* the column headings. You never want to select the column headings when sorting because they'll get jumbled up with the rest of your database (because sorting is done alphabetically).

Next, choose the SORT command on the Data menu to bring up the Sort dialog box. Here you tell *Excel* which categories, or *keys*, to use in sorting. To first sort by System, type the address of any cell within the System column in the 1st Key box. (Although B4 is shown, you can type any cell address in the range from B4 to B15.) You can also specify a "nested" sort within a sort. To subsort by Test Method and then by Keyword, type in appropriate cell addresses as the 2nd and 3rd Keys.

This sort separates the project by system (mechanical from electrical in the hair dryer example), pulls together all requirements that will be verified by the same test method, and finally pulls together all requirements that involve the same piece of equipment. After a few seconds, *Excel* reshuffles each requirement into the correct order.

You can always regain your original database order by sorting the Sequence Number column in ascending order — but only if each requirement has a correct sequence number. If you've forgotten to assign sequence numbers to some requirements and try this sort, they'll be shuffled to the bottom of the database.

The sample database required only three keys to sort it completely, but in your database you might need to subsort by more than the three keys allowed in the Sort dialog. You can coax *Excel* to sort by an unlimited number of keys by sorting in stages. If you want to sort by six keys, for example, you first sort by the three least important keys, then sort a second time by the three most important keys. (Before starting experimental sorting, though, remember to save your database under a new name to avoid possible disaster!)

Because all sorting is done alphabetically or numerically, you must be consistent in entering data. Correct all typos and standardize all terminology and abbreviations before you sort.

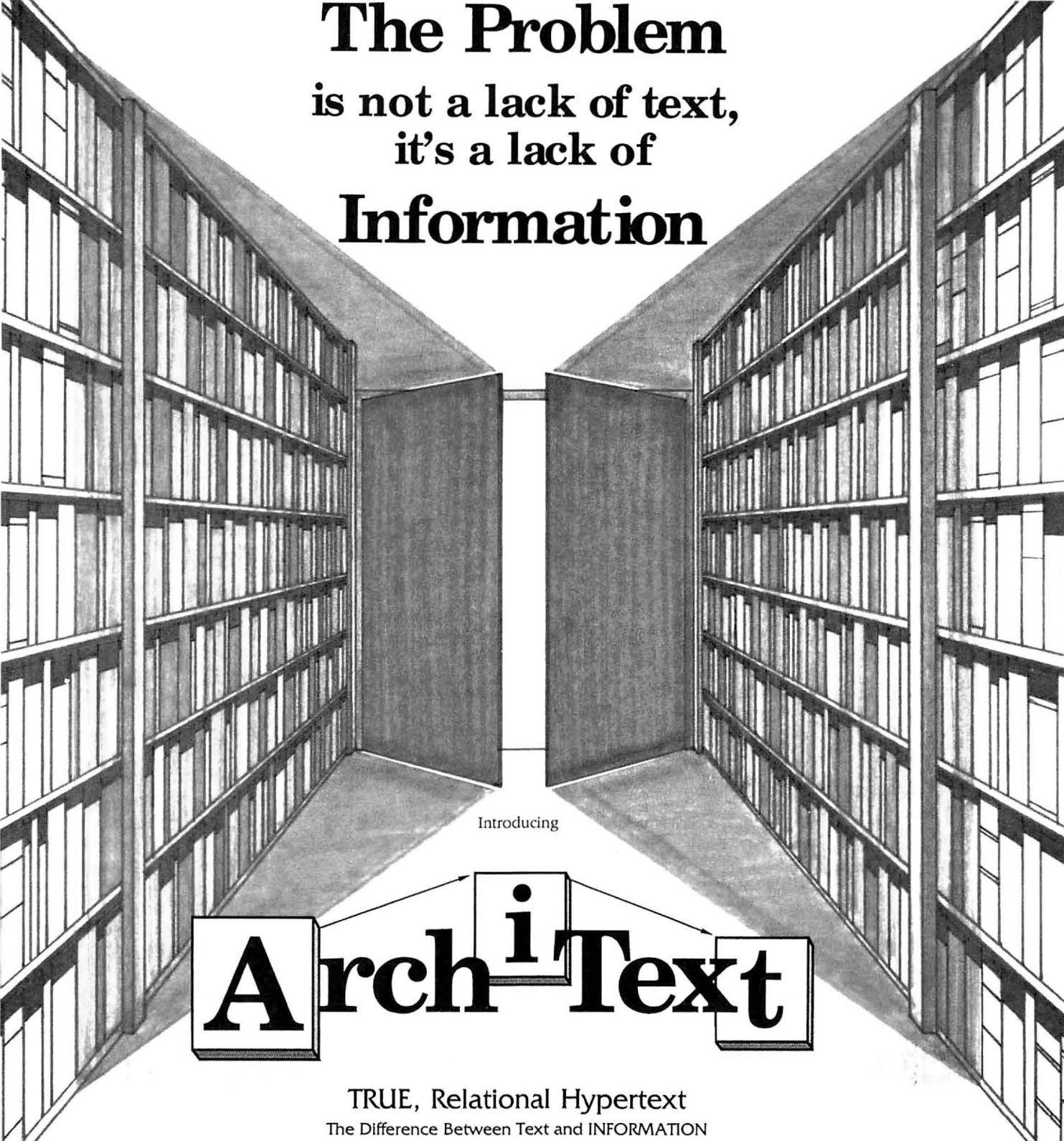
TESTING ... 1... 2 ... 3

By automatically generating a test plan from the sample database and successfully running it, you can verify that all the requirements have been met. Because the database is sorted by System, Test Method, and Keyword, it's already in the correct sequence for testing. After saving the sorted database under a new name, you can begin transforming it into a test plan. Separate the requirements into tables (according to system and test method to be used) and number and title each table. Next, format the test plan — this involves hiding unnecessary columns by reducing those column widths

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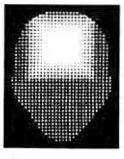
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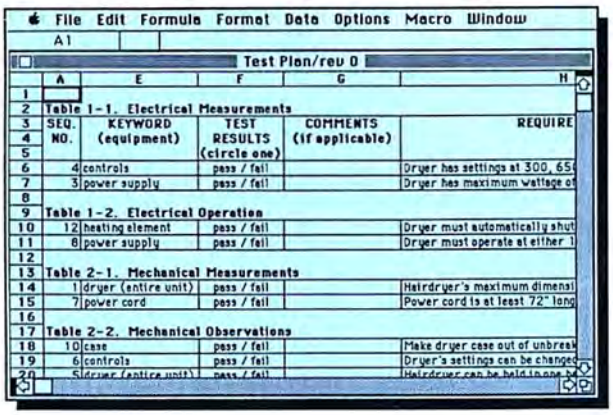
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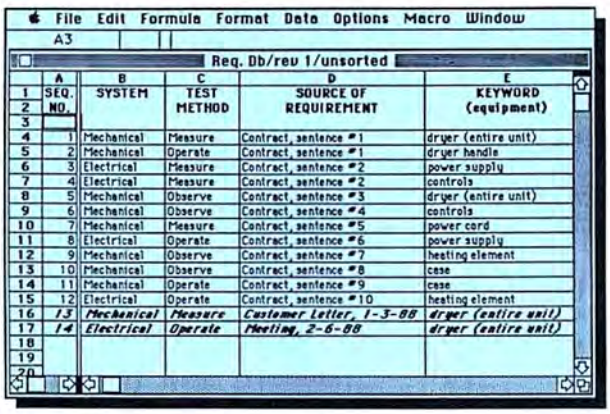
File Edit Formula Format Data Options Macro Window

A1

Test Plan/rev 0

	A	E	F	G	H
1					
2	Table 1-1. Electrical Measurements				
3	SEQ. NO.	KEYWORD (equipment)	TEST RESULTS (circle one)	COMMENTS (if applicable)	REQUIRE
4					
5					
6	4	controls	pass / fail		Dryer has settings at 300, 65
7	3	power supply	pass / fail		Dryer has maximum wattage of
8					
9	Table 1-2. Electrical Operation				
10	12	heating element	pass / fail		Dryer must automatically shut
11	8	power supply	pass / fail		Dryer must operate at either 1
12					
13	Table 2-1. Mechanical Measurements				
14	1	dryer (entire unit)	pass / fail		Hairdryer's maximum dimensi
15	7	power cord	pass / fail		Power cord is at least 72" long
16					
17	Table 2-2. Mechanical Observations				
18	10	case	pass / fail		Make dryer case out of unbreak
19	6	controls	pass / fail		Dryer's settings can be changed
20	9	dryer (entire unit)	pass / fail		Hairdryer can be held in one h

Finish creating the test plan by adding new columns and hiding unnecessary ones. (Columns B – D have been collapsed, but you can get them back by adjusting the column widths in the Format menu.) You can use a printout of this file as the actual test procedure, or you can use it as the starting point for writing more detailed procedures.



File Edit Formula Format Data Options Macro Window

A3

Req. Db/rev 1/unsorted

	A	B	C	D	E
1	SEQ.	SYSTEM	TEST	SOURCE OF	KEYWORD
2	NO.		METHOD	REQUIREMENT	(equipment)
3					
4	1	Mechanical	Measure	Contract, sentence #1	dryer (entire unit)
5	2	Mechanical	Operate	Contract, sentence #1	dryer handle
6	3	Electrical	Measure	Contract, sentence #2	power supply
7	4	Electrical	Measure	Contract, sentence #2	controls
8	5	Mechanical	Observe	Contract, sentence #3	dryer (entire unit)
9	6	Mechanical	Observe	Contract, sentence #4	controls
10	7	Mechanical	Measure	Contract, sentence #5	power cord
11	8	Electrical	Operate	Contract, sentence #6	power supply
12	9	Mechanical	Observe	Contract, sentence #7	heating element
13	10	Mechanical	Observe	Contract, sentence #8	case
14	11	Mechanical	Operate	Contract, sentence #9	case
15	12	Electrical	Operate	Contract, sentence #10	heating element
16	*13*	*Mechanical*	*Measure*	*Customer Letter, 1-3-88*	*dryer (entire unit)*
17	*14*	*Electrical*	*Operate*	*Meeting, 2-6-88*	*dryer (entire unit)*
18					
19					
20					

When updating a project-requirements database, format all new or changed requirements in bold italics. This makes it easier to keep track of what changed between revisions.

to zero. You can easily re-expose a hidden column at any time by selecting the columns on both sides of it and then resetting the width in the Column Widths dialog box in the Format menu.

As you format the test plan, you may want to add new columns that are useful in a test procedure, such as Test Results and Comments columns. Finally, save and print the test plan.This printout can be used as an actual test procedure or can serve as a high-level test plan from which more detailed procedures can be written.

TIPS ON PRINTING AND ASSEMBLING

Printing and assembling an *Excel* database can be tricky if it stretches across more than two Macintosh screen widths. Although you have a lot of control over formatting, you really have to be creative to cram all your data onto two pages.

You definitely need a LaserWriter for printing — not only because it prints small or compressed fonts legibly but also because it can shrink your database in increments of 1% until the printed output fits on two pages. You can assemble two pages facing each other in book style, but if your database stretches across more than two pages, there's no easy way to assemble the hard-copy output properly. An ImageWriter can only shrink printed output by 50%, so it can't be used for shrinking most database output because a 50% reduction makes most text unreadable. (You can work around this limitation to some extent by increasing the font size and column widths a little and then reducing them by 50%.)

THIS JUST IN

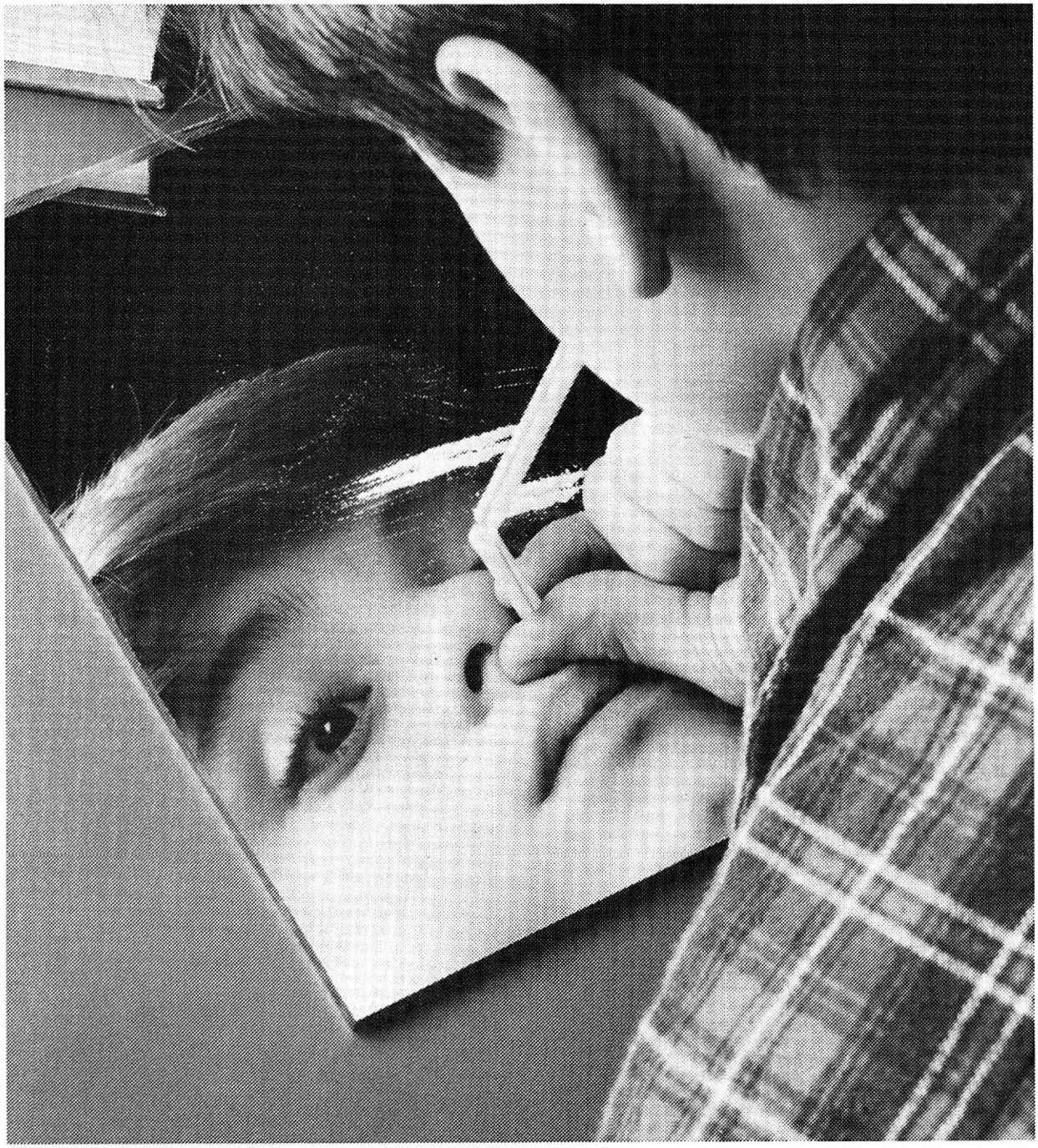
To be truly useful, a project-requirements database should be updated each time a project's requirements change. First, archive the old revision of the database, and then save it under a new name with a new revision number. The most important thing to remember when updating your database is that you must keep track of all changes. An easy way to do this is by formatting all new or changed records in ***bold italics*** and compiling a summary page at the front of your database listing every change that was made. These techniques allow for easy tracking of changes between subsequent versions of the database.

If you add any new lines to the database, remember to renumber your Sequence Number column with a new sequential series of numbers (using the SERIES command). Doing this will assign new sequence numbers to some of the requirements each time the database is updated. If you want to keep the same sequence numbers throughout the life of a project, you'll have to manually number new requirements and leave blanks for deleted requirements. This kind of numbering scheme can lead to problems, though, as the following example illustrates.

In the hair-dryer database, suppose you add two new requirements to the middle of the database (between requirements 5 and 6, say). The sequence numbers of all requirements after them will then be incorrect. You could correct them by using the SERIES command to assign a new sequence number to each requirement or you could manually number the new requirements 5.1 and 5.2. Then, however, you could no longer tell how many requirements you had by looking at the number sequence, and you wouldn't know that some requirements were missing if they were accidentally deleted. You'll have to decide which is more important to you: keeping your sequence numbers consecutive or keeping them consistent.

Using a project-requirements database in *Excel*, you can ease your burden as a project manager by reducing schedule delays and cost overruns — whether your project is manufacturing a product, writing a document, planning a wedding, or running for president. It takes some effort to plan ahead, but once you see how much you've saved — in time, money, and headaches — you'll agree it was worth the effort.

SANDRA SNOWDEN ELAM IS A TECHNICAL WRITER WORKING IN THE WASHINGTON, D.C., AREA. A MACINTOSH DEVOTEE, SHE'S CURRENTLY SAVING FOR A MAC II.



HE'S THE IMAGE OF HIS FATHER.

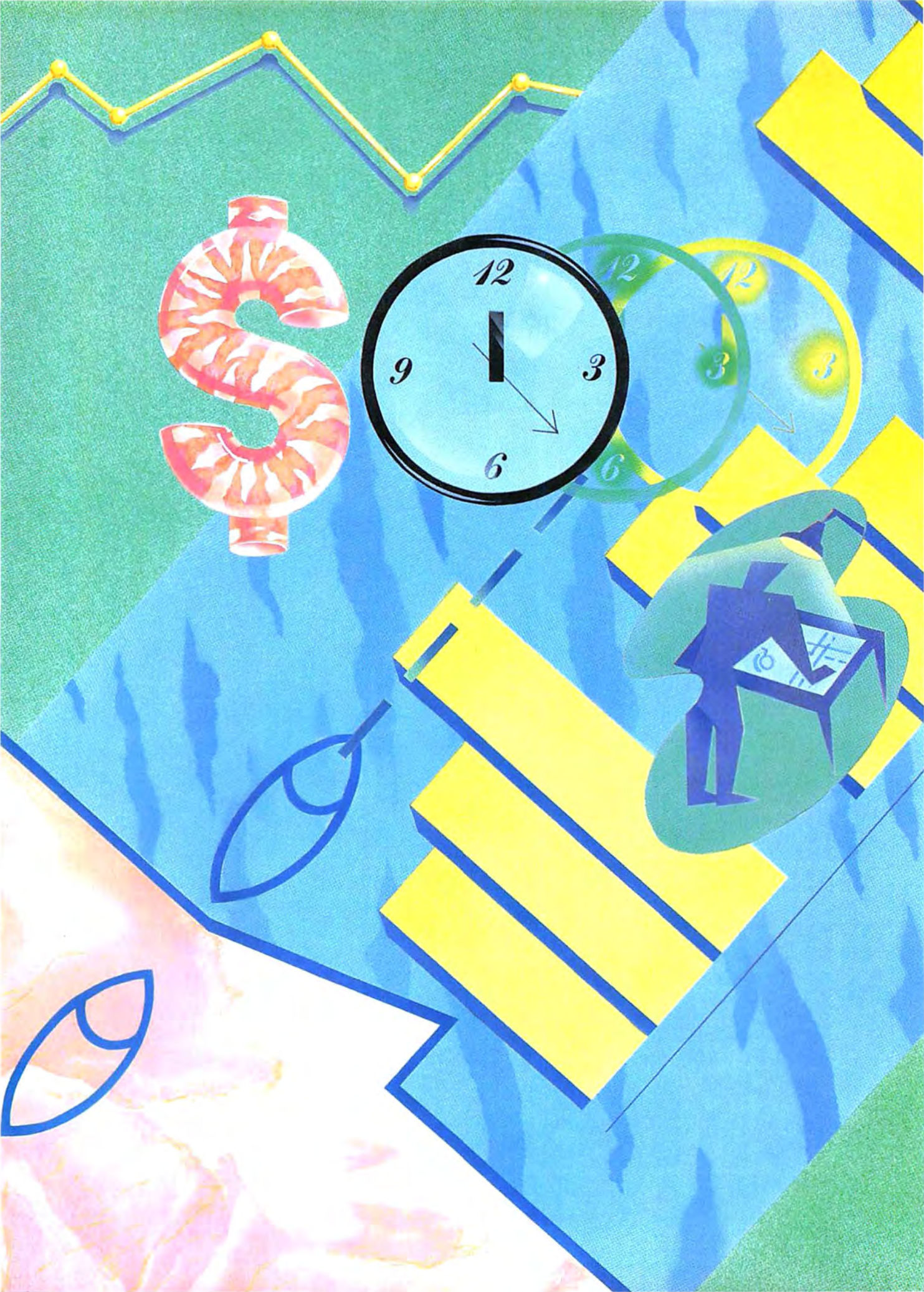
People who turn kids onto drugs aren't always the dregs of the earth. They're people who love children more than anything. Parents.

Everything mothers and fathers do, no matter how discreet, leaves a lasting impression on sons and daughters. With millions of parents doing drugs, it's no wonder millions of kids are doing the same.

So if you're wondering where children pick up their habits, where in the world they get them from, you don't have to look very far. It's you.

IF PARENTS STOP, KIDS WON'T START.

Partnership for a Drug-Free America.


12
9
3
6

Going with the Flow

The flowchart is making a comeback, both philosophically and practically. Don't let memories of pen-and-paper pain keep you from joining this new trend.

BY SALVATORE PARASCANDOLO

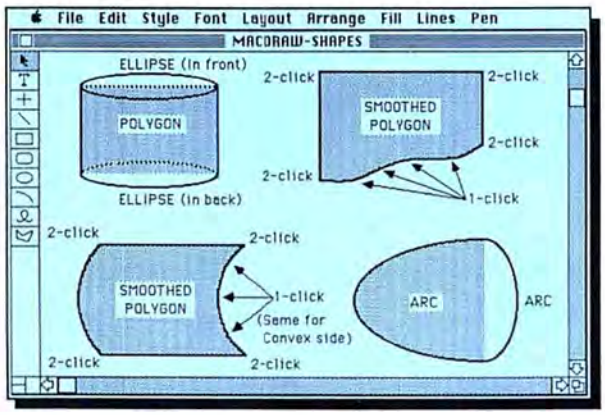
You're faced with a flowcharting project. What do you do? Do you run to your art department? Do you leap for your Mac? What do you grab from your magic toolbox? What will you do with it? Flowcharting is a deceptively simple craft . . . for most people. How do you feel about it? Do you pull out a plastic template and a bottle of aspirin? Well, you can quickly and painlessly create consistent, high-quality work with Mac applications you have on hand for other uses.

During a casual visit to a relocated office mate, I passed by a room lined with purring Macintoshes. A group of intelligent people were intently drawing flowcharts with *MacDraw*. These were software engineers and process designers, who, understandably, hadn't had much art training. Each had his own time-wasting techniques. Every hand-crafted flowchart looked . . . let's say, "Unique" . . . let's say, "Appalling." Laser printing those works of art produced no miracles.

Then, rather ironically, fate dropped a flowcharting assignment on my own doorstep. I ran to my Mac and faced the task with my own ignorance and thunderous inefficiency. I too was soon spending much of my time tweaking, aligning, and microscopically connecting. I cringed at the thought of making changes to completed diagrams. I began to consider pen and paper an attractive option.

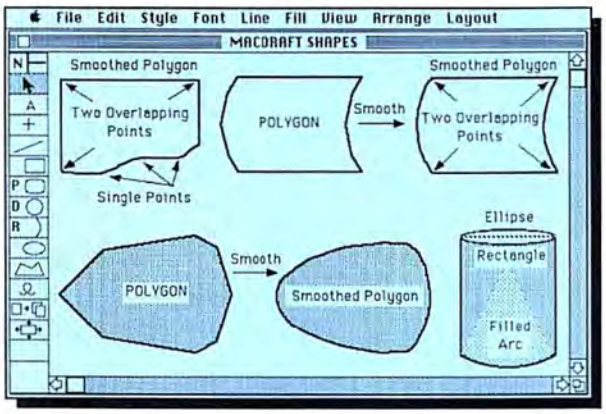
Luckily, though, because of the sheer volume of the work I was doing, through perseverence I developed a collection of techniques and lifesaving short cuts that allowed me to progress from 20-minute pages to 8-minute pages to 4-minute pages. I graduated from chaos to consistency. Changes to diagrams became child's play.

Deciding to make your own flow di-



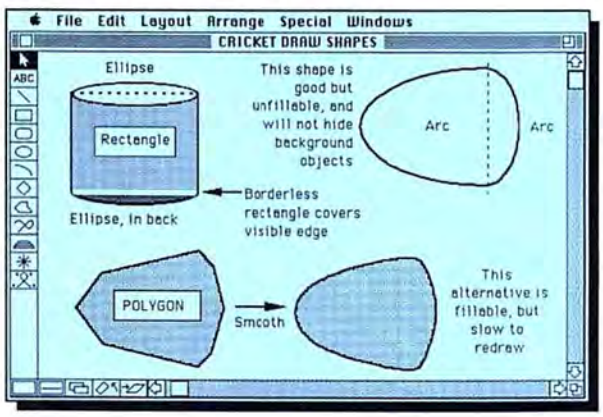
MacDraw Shapes

I found it easiest to use *MacDraw* for these special shapes. The points marked with "2-click" indicate that you hold the Option key down and double-click at that location. This method retains a sharp corner after smoothing. Although there are several approaches to producing these figures, the methods used here result in easily resized and filled symbols.



MacDraft Shapes

For part-pointy/part-smooth symbols, you need to create two adjoining vertices and overlap them after you finish the polygon but before you smooth it.



Cricket Draw Shapes

The mass-storage symbol is straightforward. Here are two ways to make a CRT symbol. The arc-based technique redraws quickly but is forever transparent.

agrams makes sense for several reasons. You can design as you go, and you always have a ready-to-print version of your process. The flow has to be laid out anyway, so why not do it electronically?

You don't have to communicate changes painstakingly to diagrams — you just make them. You eliminate the endless cycles of submitting roughs, waiting, proofreading, submitting corrections, waiting.

To produce the flowcharts you need, your two basic choices are a dedicated application (see sidebars "Test Driving *MacFlow*" and "Projecting Your Thoughts") or a graphics application with the horsepower to do the job easily and appropriately. With a dedicated application, you can hit the ground running. After a period of familiarization, you just start flowcharting. There is, however, a set structure and appearance to your work, and generally, you must conform to a limited way of doing business.

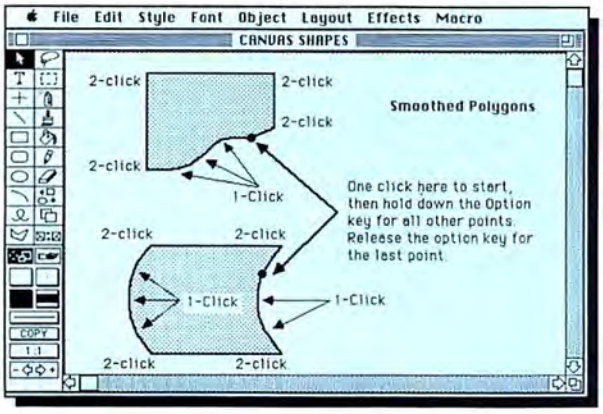
Because flowcharting involves simple objects in simple arrangements and requires only a few basic graphic capabilities, any object-oriented package can handle this task.

When you flowchart with a graphics application, you can customize your symbols and even replace them with images of real items such as printers, disk drives, monitors, and anything else you can draw, paste, or digitize. Moreover, if you use such a program routinely, you're saved the learning period and the inevitable surprises.

FLOWING FREE

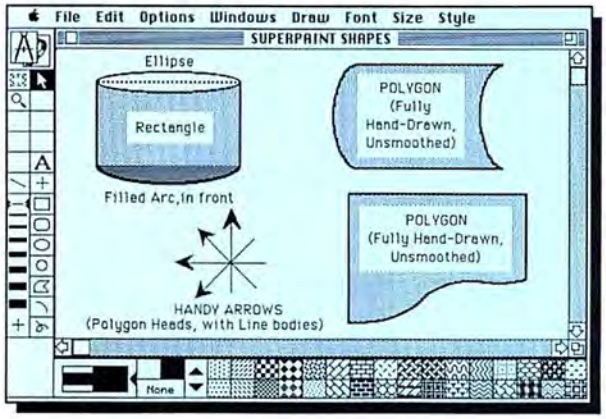
I prefer to create most of my diagrams with an object-oriented graphics application. It's hard to give up a familiar interface and infinite flexibility, even if it means sacrificing some specialized power. If you're not one of the six people in the solar system who doesn't use *MacDraw, MacDraft, SuperPaint,* or some object-oriented program, you can add some of their power to your familiar drawing application. You can immediately use all the short cuts you've accumulated through your own experience. Add a few optimizing techniques, plus a document full of reusable predrawn symbols, and it's possible to produce any given flowchart easily and quickly.

Because flowcharting involves simple objects in simple arrangements and requires only a few basic graphic capabilities, any object-oriented package (*MacDraw, MacDraft*) can handle this task. Object-oriented here means



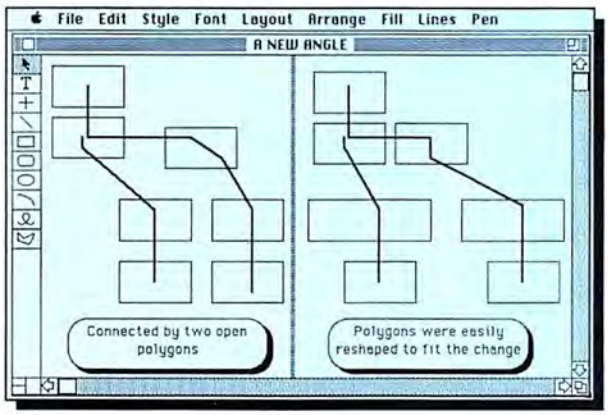
Canvas Shapes

Provided you don't hold the Option key down during placement of the first point, you can render all shapes as you would with *MacDraw*.



SuperPaint Shapes

Here's my "handy work," the pseudosmoothing done with a steady hand and a lot of enlarged-object reshaping. The homemade arrows are necessary to fill *SuperPaint*'s empty quiver.



A New Angle

This "bent wire" connection method uses an open polygon that you can freely reshape, thicken, or remove when you make process changes. This method may not be possible with some applications, as not all leave their polygons open.

easy repositioning, grouping, and resizing of drawn objects, and it lets you freely edit any embedded text. Ideally, you'll also want quick response, easy alignment, unencumbered text handling and editing, access to predrawn objects, and LaserWriter support.

Paint-only (*MacPaint, FullPaint*) applications simply won't do. You may get by for simple work, but you give up laser-print quality and multipage capability, and you'll have a mental breakdown when faced with all but the simplest changes.

Here's a list of applications that are capable of object-oriented graphics and that I've flowchart-tested. The order of appearance reflects my preferences for flowcharting purposes.

MacDraw: It's excellent for flowcharting. It's a small, snappy application with a good balance of features, and it's well proven in combat. It offers easy creation of standard shapes, grids, alignment, intuitive text handling, global attribute changes, free resizing of grouped objects, arrows, multipage documents, and fit-in-window viewing. It's nicely balanced for the job. *MacDraw* is also small enough to live in a modest *Switcher* partition (for most flowcharting work, 200K is plenty).

Its offspring, *MacDraw II,* a considerably larger program, supports flowcharting even better. It can create and access parts libraries, it has drawing layers that can be made invisible, and it works in color. It also provides full text justification and mixed fonts in one block. Documents can have named regions (views) to which you can travel instantly.

Canvas: This relative newcomer has many of *MacDraw*'s features, gobs of zoom-in/zoom-out power, and also comes as a desk accessory. It's closest to *MacDraw* in flowcharting prowess and even includes a painting mode. It's fairly quick and quite workable. Its best feature is its MacrObject capability, which lets you draw anything and then save it as a menu-selectable item, complete with a user-assigned name and a reduced-view icon of the object. Perfect for flowcharting!

With *Canvas* you can produce objects that are partly smoothed and partly sharp-cornered, but you must follow this rule: The first point of your object must be placed along the smooth section with the Option key up. After that you can hold the Option key down and double-click wherever you need a corner.

MacDraft: It sports a *MacDraw*-like, multipage environment with good variable zooming. *MacDraft* has intelligent arrows that remember which way they were drawn so their heads always point away from their origin — very handy.

Many flowchart objects are simple polygons. *MacDraft* draws and reshapes them well but keeps its polygons in a Reshape mode. To make a polygon easily resizable, draw a short line inside its boundaries, send the line to the back, and group the line and the polygon. *MacDraft* will then bless you with resizing handles. Keep in mind that *MacDraft* only allows proportion-

Test Driving MacFlow

If you want an easy (if somewhat pricey) ticket into the world of flowcharting, try *MacFlow*. It's a dedicated application that provides a specialized graphics environment for easily accessing and connecting standard and custom flow symbols. You can construct multipage flowcharts that can easily be linked or nested to an unlimited depth.

MacFlow, like many graphics applications, has a vertical palette from which you drag predrawn symbols into place on your working document. You can duplicate, resize, and reproportion each shape at will. When you resize an object, its center remains fixed, saving you the chore of repositioning it afterward. For a symbol's border, you can choose from four widths and four patterns for any or all of your symbols. To add some depth and interest, you can also specify global drop shadows.

The separate Symbol Librarian application lets you create your own symbol palettes from imported objects. Although you can use only one custom palette at a time, each palette file can contain up to 200 symbols. The Symbol Librarian lets you specify the size and position of a symbol's text area, the number of possible connecting points, and its relative stacking order within the palette.

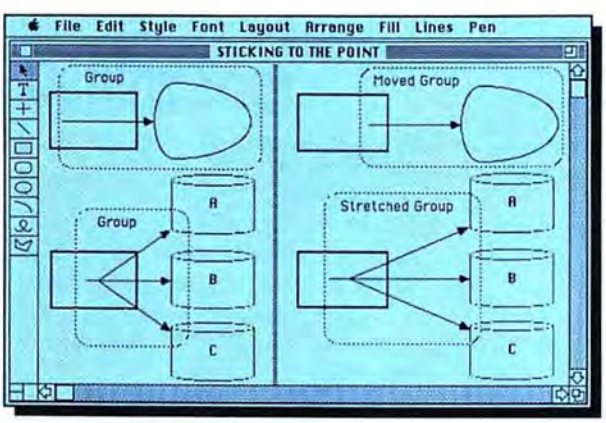
To add text, just select a symbol and type. Each symbol's text can have its own font and style. Text will wrap automatically within the symbol, and you can justify it left or right or horizontally center it. Vertical centering is automatic. Any text that overflows the capacity of a block will be invisible, but you can view it by enlarging the containing symbol. You can type up to 32,000 characters in one block.

To connect symbol X to symbol Y, click in the middle of X and drag to the middle of Y. *MacFlow* then draws a connecting line between the closest sides of X and Y. These lines can have one of four widths and patterns, with arrowheads at their origin, destination, both, or none. If you move connected shapes, the lines stretch and maintain their connection as if they were rubber bands. You can use *MacFlow*'s snap-to-grid feature to make positioning more consistent, and if you like you can display the grid. You can attach text, such as "yes" and "no" labels on decision paths, to the centers of lines. *MacFlow* will keep a label automatically centered on its home line.

NESTING INSTINCT

Double-click on any symbol, and it will zoom open to reveal another page-size space for a subordinate flowchart. Using this hypertext-like hierarchical nesting, you can first draw a system-overview diagram and progressively expand each general description into its detailed steps. You can nest charts for as many levels as you need. It's a winning feature of *MacFlow*, and it makes it suitable for simple interactive presentation or training. Its on-disk tutorial is, in fact, a set of nested flow diagrams that take you from general subjects to the steps needed to achieve specific effects. Symbols that link to subordinate charts have drop shadows.

MacFlow's page preview is not just handy but vital. You can navigate through a large flowchart by moving a dotted-line frame over a reduced whole-document view. In that mode you can also grab the entire flowchart and shift it relative to the page. With a few trips to the Layout menu, you can embellish your flowchart with a logo, date, two lines' worth of title, and a page number. You can also show the document name, which can optionally include the names of all higher-level charts in its entire hierarchy. The date, time, and document-name formats can vary from brief to fully expanded. *MacFlow*'s management of nested documents extends to its printing options. You can print only the chart in the active



This is a real time-saver when you use arrows to link two objects. Hide a good chunk of the arrow's shaft under the tail-side object and group the arrow with the point-side object. Now you can freely adjust distances without constantly tweaking your arrow length. Some arrows can be grouped so that they all stretch or shrink together, saving many individual adjustments.

al resizing of grouped objects. If you need to squeeze or stretch your work in only one dimension, you'll need to completely ungroup the affected objects and patiently tweak each one. To make a part-corner, part-smooth polygon in *MacDraft*, click once at a corner point, then click again about ⅛-inch away to create a second point. When you've closed the polygon, overlap two adjacent points where a corner should be. When you smooth the polygon, you'll have real corners.

Cricket Draw: This program has good shape-creation features. Grouped objects resize well, but you can't change their collective fill or line attributes in one operation. That's only a minor setback, as most of your symbols will be vanilla-white and thin-lined. Its zoom-in/zoom-out feature helps in fine-tuning shape templates and in seeing the overall picture. As with similar applications, smoothed objects refresh slowly.

Cricket Draw also offers a broad range of line widths and full arrow capabilities. At your request, it puts an arrowhead at the end of any kind of line. To add text you must enter the Text mode, but once you've typed a block, you have full control of justification, style, and rotation. You can even mix fonts and styles in one block.

On the minus side, your layout can only be one normal-size page. Also, you can't perform style or font changes for your whole document at once, which can really slow you down if you

window, or the active chart and its subordinates, or all charts nested within the open document.

SPECIAL ASSIGNMENT

In real-world systems, it's not uncommon for a subroutine to be referenced by two or more processes. *MacFlow* provides this kind of multiple linking with its ASSIGN command. Any number of symbols can be assigned (to zoom) to the same logic block. Assignment links can be broken with the RELEASE command. These nesting and linking abilities are excellent for managing the many fragments of a large project without additional bookkeeping while automatically supporting the natural relationships among the components of a process.

Another power tool is Insert, which essentially copies the contents of a named flowchart file and pastes them into the currently active document. With this time-saving technique, you can initially construct several general-purpose logic structures, each in its own document, and reuse them in your production work.

ROCKS IN THE RIVER

In several annoying ways *MacFlow* handles objects differently from the way in which most drawing applications do. To select an object for manipulation, you must click precisely on or slightly outside its perimeter.

If you click inside its border, you're sucked into the text-entry mode. You can select multiple objects, but you can't group them. Whenever you need a group action, you must take the time to select all members manually. *MacFlow* lacks a bring-to-front/send-to-back capability, so you can't freely restack objects, but it seeks to make amends by allowing you to set a permanent stacking-order assignment for each symbol.

Its reduced-view mode is useful, but you can only work and edit in normal size, where you must scroll frequently, which is tedious. Whenever you reposition or resize a shape, *MacFlow*'s auto-connectors shift to follow the relocated centerlines. This effect is not always desirable, as lines that you've painstakingly drawn at right angles suddenly slant and you must hand-adjust them to keep your flowchart from looking like a rickety building. *MacFlow* should offer the option to preserve right-angled connections automatically when objects shift.

The Symbol Librarian needs beefing up. It has no drawing tools of its own — none. To make your own symbols, you need a drawing application.

Once a symbol is imported, you must define its text-entry zone. Good idea, right? But you have to define that zone numerically, by typing the percents of Horizontal Inset, Vertical Inset, Horizontal Offset, and Vertical Offset. And you can't see the effect until you click OK. If you don't like the result, you must repeat the menu/dialog/type-type/OK procedure. While positioning a text rectangle inside an irregular object, I felt like a monkey instrument-landing a plane. Fortunately it wasn't fatal. Did I mention that the Symbol Librarian has no undo facility?

FLOWING RIGHT ALONG

With its dedicated flowcharting features, *MacFlow* seems to be headed in the right direction. It has its limitations when compared to today's graphics applications, but then it doesn't pretend to be one. Its flowcharts can be pasted into *MacDraw* and customized there. Its interface is fairly intuitive, and the necessary learning process is short. *MacFlow*'s considerable talents and its prowess with hierarchical documents may be ideal for your flowcharting needs, especially if your project is large and highly stratified. It's certainly well worth a test drive.

need to refont a large flowchart. Accessing *Cricket Draw*'s wealth of text features is cumbersome compared to most other graphics applications.

SuperPaint: Basic shapes are easy to draw with *SuperPaint,* but the absence of a smoothing function requires you to hand-shape the curved sides of some symbols. Any lumpiness invariably shows up in laser-printed output. The best recourse here is to define rounded shapes as large as possible, point by point using the Polygon tool, then carefully to reshape and reduce them.

SuperPaint handles text fairly well. If you group text with a symbol and then reduce the symbol, any text that no longer fits in its confines will be invisible and may be forgotten, so take care to proofread your work after resizing all or parts of it. *SuperPaint* sorely lacks a working "reduced view," which means you must scroll a lot during layout.

> With any of the applications first create a set of flowchart symbols, taking as much time as necessary to achieve presentation quality.

If you want arrows, you'll need to use the Polygon tool to construct your own arrowheads and store them as reusable objects. A collection of heads rotated in 45-degree steps should serve for most work. Construct each arrow with a polygon head and a line shaft. You can freely reshape the head when you need special angles. To resize an arrow's shaft by any significant percentage, you should ungroup it from its head to avoid distortion.

SHAPING YOUR FUTURE

With any of the graphics applications, first create a set of flowchart symbols, taking as much time as necessary to achieve presentation quality. You need to create these symbols only once, but you'll be using copies of them over and over. Take care, as any flaws you overlook will be copied into your subsequent works. If you're not artistically inclined, have the symbols drawn by someone who is. Generally, once you've done this, using them and laying them out into flowcharts is similar

with all listed applications. When you add text inside a flowchart symbol, be sure its fill (and line pattern where applicable) is "None," or the parts of the symbol's border may be obscured.

After you've rendered your symbols, construct and save high-level structures you use frequently, such as If/Then/Else blocks, top-test and bottom-test loop blocks, and Case blocks. A subassembly document shared among a work group saves time for every user and promotes a consistent appearance in the group's documents. When your project requires a new symbol or new subassembly, create it and update your subassembly document. Before you make distribution copies of that document, lock it by clicking the Lock box in the file's Info window (do this in the *Finder*, using the File menu). The file and its locked status will copy to other disks, and its contents can't be modified accidentally.

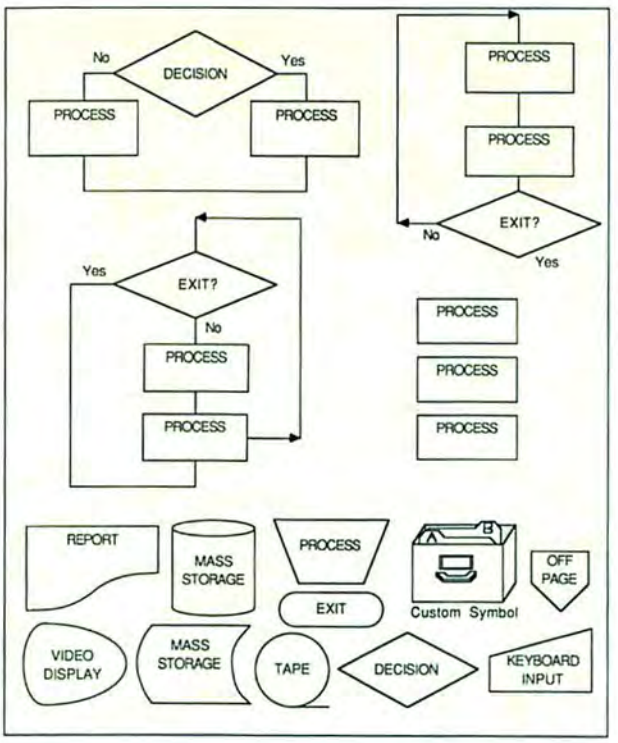
Angular shapes are easy to render with all applications, especially with the aid of a grid. Symbols with smooth curves, such as the ones for Storage and Hardcopy, generally require more time and effort. Each application has its own philosophy on the way lines and polygons are closed, smoothed, and filled.

MacDraft can't easily make polygons that are both partly angular and partly smooth. *SuperPaint* doesn't smooth at all. *MacDraft*, *Cricket Draw*, and *SuperPaint* all force their polygons closed with an automatic last line that you don't always need. *Cricket Draw* doesn't fill arcs.

Study the illustrations to learn the various components and techniques for constructing the tricky symbols with each application. If a shape is not shown in the illustrations, it means the technique is precisely the same as with *MacDraw*.

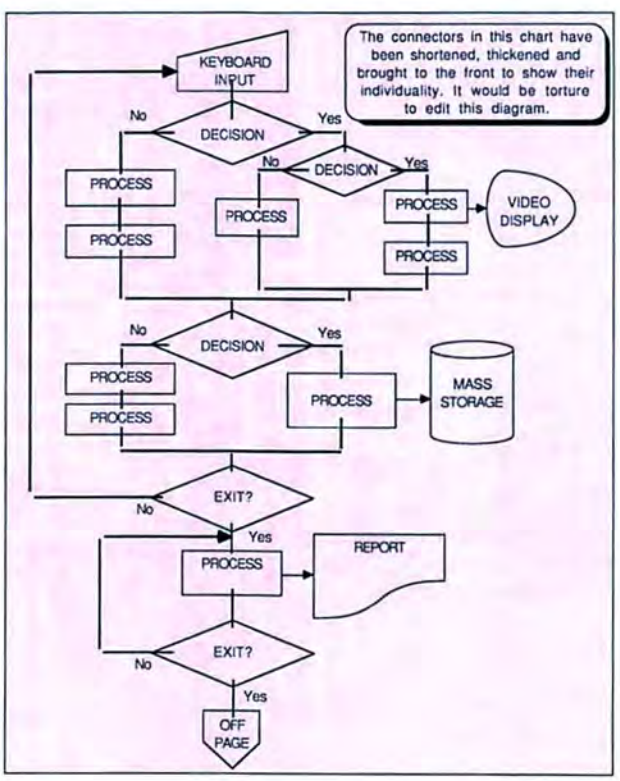
THE PATHS TO SUCCESS

When you're ready to create your first production flowchart, open a blank working page and your premade symbol document and keep one of its corners visible below your working page. If you're using *MacDraw*, *MacDraft*, or *Canvas*, give your document



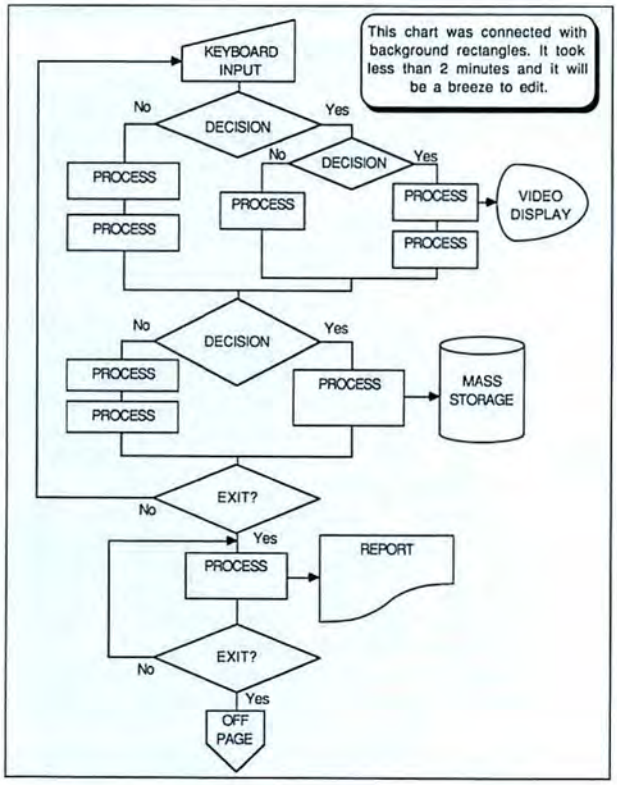
Working Groups

This collection of typical flowchart structures is a group of predrawn symbols and groups that can be pasted into a working document. You can add your own macro structures and project-specific graphics as you go.



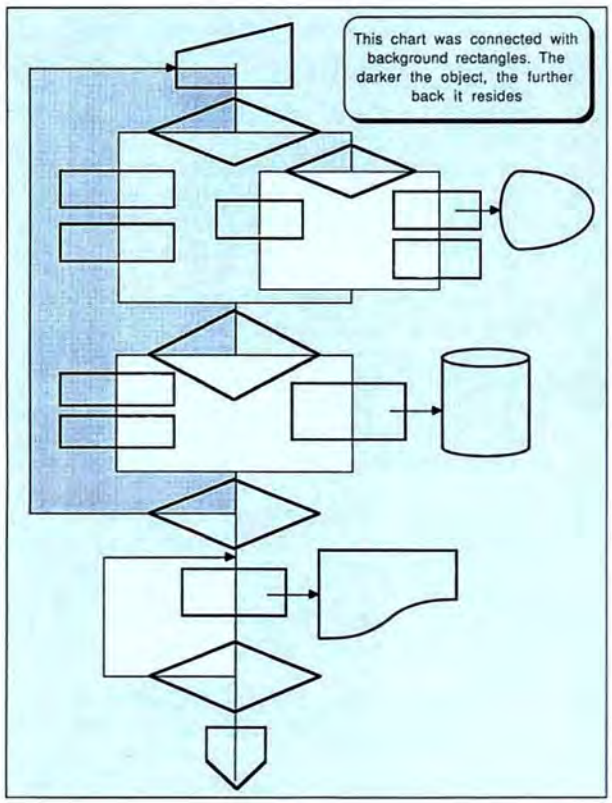
Time Chart

This is the Neanderthal approach to connecting your process symbols. Individual lines not only take time to draw but are also a nightmare to modify, align, and realign if you make changes.



Smart Chart

The connections here are made by simple rectangles that are sent to the back. The precisely linked appearance of the diagram speaks of painstaking work.



Connections Revealed

Here, through the transparent symbols, you see the few background rectangles required to define the flow in this diagram. The rectangles are shaded to indicate their layering order. It's easy to add or remove process boxes, resize a branch of the path, and perform only minimal adjustments to the connectors.

an extra page so you'll have some extra room for storage and maneuvering.

From your subassembly library document, copy the shapes and groups you need and then paste them into your working document. One copy of each item will do fine because you can duplicate what you need when you need it. By placing your copied symbols into your working document, you'll save the overhead of switching between active windows. Keep your symbols document open (with just a corner visible) just in case you need something later.

After investing so much time in making symbols, be sure you don't squander your savings when you connect your symbols. You have a Mac in front of you. Don't think of the connection process as if you were using pencil and paper. If you begin to view your linking lines as underlying geometrical shapes, you can make your chart elegantly connected and a breeze to modify.

To connect a top-down process, simply draw a vertical line down the center of the page and lay your process boxes on top of it. This main line should always be sent to the backmost layer of your chart. You can connect more complex structures with other surprisingly simple background objects.

Consider connecting an If/Then/Else structure. How many objects would you need? Nine? Seven? You can do it with a single rectangle. You can then add, resize, or delete process boxes, and your connection will be preserved without a click of extra work. In this way you can produce a chart two to three times faster than by using individual line segments.

To connect If/Then/Else blocks, use a white-filled rectangle and send it to the back. Then send the main flow centerline to the back to prevent it from showing through the middle of the If/Then/Else structure. Rectangles that serve as loop-back connectors can be left unfilled because they're always off to one side of the centerline.

When you're defining a meandering path, consider using the Polygon tool to make the path a single line with appropriate kinks in it. You can make whatever gnarly path you need and easily adjust its vertices in Reshape or Edit mode. Because the path is a single

object, you can easily emphasize or deemphasize it by changing its width or pen pattern. Currently, only *MacDraw* and *Canvas* are suitable for this technique, because they wisely leave polygons open. The other applications will automatically create a final line that connects the last point of the polygon to the first.

Whenever you need several evenly spaced lines, use the following technique with all the applications (except *Cricket Draw*). Draw your first line, then duplicate it and move the copy to its correct position. Then press Command-D repeatedly. Each successive duplicate will be drawn displaced by the same amount as the first clone. With *Cricket Draw* consider using the Grate tool for this purpose or use Command-D to bring up the duplication dialog box, where you can specify the vertical and horizontal offset for the line clones. Once you've done that, click the duplicate icon at the base of the window for each copy you need.

> Don't make your flowchart look like an amateur archery range. In most flowcharts the presumed flow is downward. Any paths that go that way don't need arrows to guide the reader.

To change the spacing between an existing set of evenly spaced lines, group them all and stretch or shrink the group like an accordion. The spacing will adjust itself perfectly.

POINTERS ON ARROWS

Don't make your flowchart look like an amateur archery range. In most flowcharts the presumed flow is down-

Projecting Your Thoughts

If you need project-flow diagrams as well as a helping hand with your planning activities, consider *MacProject II*. It provides visual scheduling tools such as box and time-line charts, and it can crunch numerical data, such as dates, durations, and dollars.

MacProject II is useful for planning, estimating, and progress-tracking any activity. It furnishes several views into a project's vital statistics based on fixed dates, daily working hours, and nonworking days. It also calculates periodic cash flow based on workers' salaries, material costs, and incoming funds.

You begin by laying out a visual flow of a project, activity by activity. Add a little more data and some good sense, and *MacProject II* can easily calculate management information such as periodic cash flow, resource usage, latest/earliest dates, and the feasibility of meeting milestones. You can change the relationships among tasks and their associated data at any time, and all project reports will reflect your changes. If you need to minimize costs, accelerate progress, or reduce idle time, *MacProject II*'s "what if" capability helps you to refine your plan accordingly.

You define your project visually in terms of tasks, subtasks, and milestones, each represented by a special type of box that you simply stretch to a suitable size and then label with the name of some activity. You can move a box anywhere in the layout. The legal flow of dependent tasks is to the right and down. You can navigate through the Schedule Chart by clicking on a box or by using keystrokes: Tab moves one box to the right or down; Shift-Tab moves one box to the left or up.

You can enter notes in any free space on the charts, and each note can have its own font and style. The note blocks aren't movable, but you can cut their text from one place and paste it at another — essentially moving the note.

After you've named and sequenced the project's tasks, select each task box, activating its Task Info window, and enter the planned duration, names and quantities of people or equipment (resources) assigned, and what percent of their time they'll spend on that task. Once you're in the Task Info window, you can cycle forward through all the tasks with the Return key or backward with Shift-Return. The maximum chart size is 94 x 48 inches.

Although the Schedule Chart view is free-form, you can instruct *MacProject II* to arrange your task boxes in generally relative positions on a time line. This option is primarily cosmetic. A precise time-line view is also available.

You can select what task data (earliest start, duration, resources, and so on) will be displayed in the Schedule Chart view and in which corner of each task box the data will appear. You can display up to four items per corner if your chart is fairly uncluttered. Each resource needs its own slot.

ABOUT TIME

It's not unusual for contributors to a project to have different working hours, different work weeks, and even different holidays. *MacProject II* lets you define up to eight different work calendars and then assign each resource to an appropriate calendar. You can define and save calendars as reusable documents.

No matter how deftly you lay it out, the plan for a sizable project can soon become a confusing web of paths, boxes, and numbers. *MacProject II* neatly resolves this dilemma with its Supertask box, which in itself represents and summarizes an entire subproject.

Any large project can be divided into simpler subprojects, each being treated as a single task. You draw a box and tell *MacProject II* that it's a supertask, which by definition links to a subproject file. You then select the name of an existing file or create a new one, which opens immediately. A subproject is just another project file, which itself can have subprojects. You navigate between levels with menu selections. With one simple CONSOLIDATE command, any changes in any subprojects will be reflected in any related supertasks.

On any one project document, you set the scale of the time line, which can be minutes, hours, days, and so on. After you set it, you must express all your time values in the units of your chosen scale. This may not be clear or convenient (quick: what fraction of a week is 1 hour and 15 minutes?). The subproject capability breaks the bonds of a single time scale. It lets you define each subproject with its own best-suited scale, and then it effortlessly consolidates those mixed subproject scales into the main project.

FINE-TUNING

While the project is underway, you can amplify each task's data with its actual start and finish dates, costs, and income. The changes you make will be reflected throughout the project in the form of modified values and visual cues and warnings that indicate a new critical path or dates that can't be met. A comparison of the planned and actual values is valuable accounting information, and its feedback can help you be a better estimator.

TASK TIMELINE

The Task Timeline view uses previously entered data and displays bar graphs for each task, distributed on a time-scale background. There are two partially overlapping time-line bars for each task. One bar shows the planned start and duration, and one reflects the actual start and duration that are logged in as activities proceed. Beyond serving as good feedback, you can shift and resize the actual time line, and all subsequent actual time lines will adjust to the change. You can also communicate the "percent doneness" of a task by dragging a "thermometer" line from 0 to 100 percent across the actual time line. Your graphic actions are converted into updated task information, which will be reflected in all other views and tables.

MacProject II offers several search options, depending on the current view. You can search the Schedule Chart based on the text contents of task boxes. As each qualified task box is found, it's automatically selected and its Task Info window is made available. In the time-line views, you can search by specifying combinations of names, dates, and durations. *MacProject II* will then hide all the time lines that don't meet your search criteria.

When you search the Project Table, you can use elaborate search criteria based on all the known data. *MacProject II* helps you build your search formula with minimal typing. A dialog box presents all the field names and logical relationships. You only need to enter sought values.

In table views, you can search based on a simple search string or a formula. The formula will display only matches, and the simple search string can be used to navigate through that subset. The Cash Flow Table can be a vital asset if your project plan includes costs and incomes. It obtains its data from the task information you've entered previously and shows the amount of money expended/received each period and a cumulative amount as of that period.

You can examine how your resources — your power — will be applied to tasks at hand. The Resource Histogram view shows any overuse or underuse of people and materials by comparing the quantity of a resource needed at each project stage against what's available. Adjusting the resource allocation with the Resource Histogram as a guide can help level the load, adjust the schedule, or support a decision to add more resources.

Software in this price range should go out of the way to provide a variety of multiple simultaneous views. *MacProject II* falls somewhat short. It has too little visibility. You can view only one project at one time and at most two windows can be open simultaneously: Task Info and Schedule Chart, Task Info and Task Timeline, or Task Info and Resource Timeline. There is no need for these limitations in today's window-wise world. The next major release should address this tunneled vision.

If you did some searching through a project file and didn't choose to show all tasks before you closed the file, it will open next time, showing only a subset of its data and no indication that it's a filtered view. In the Calendars dialog box, the Default button sets the calendar back to 1/1/7. I foolishly thought it would make my meticulously entered date the default start date for all future projects. If you use hours as units in the time-line scale, you must set Visible Fields, in the Display Formats dialog box, to Hours/Mins; otherwise, regardless of the scale, the time-line divisions show only the date.

MacProject II is so much more than a charting tool that it almost falls beyond the purview of this article — almost. Its pictorial views into a project can certainly save time analyzing and presenting its status. Keep in mind that it offers virtually no graphic options, but you can export its charts to *MacDraw* and groom them there. If project management and frequent progress reports are a black hole for your time, this could be your software.

ward. Any paths that go that way don't need arrows to guide the reader. Loop structures normally require an arrow to show the loop-back path from their no-exit condition. The optimal way to install arrows in your flowchart depends on your graphics application. Use an arrow by itself, grouped in multiples, or precisely overlaying the perimeter of a background rectangle. The latter is used to override the normal flow, as in loop structures.

When you connect two objects with an arrow, give yourself plenty of editing freedom by making the arrow extra long and hiding the excess under the tail-side object. Group the arrow with its point-side object. If you move the point-side object later, the arrow travels along with it, still perfectly connected. Its extra-long hidden tail will take up the slack or feed you extra length as needed.

DON'T GET RID OF THE GRID, SID

When the grid is "on," objects snap to the nearest grid divisions. This effect can be useful for aligning, sizing, and connecting your objects quickly. The grid-snap effect can also be a hindrance if it prevents you from positioning objects where you see fit. But if you deactivate the grid, you'll end up spending considerable time tweaking objects into consistent alignment or size.

Here's a workable compromise: Keep the grid active, and customize your rulers or grid (depending on your application) so that the number of divisions is not 8 but 16 or 32 per inch. You'll have the advantage of grid-aided operation, but the grid-snap jumps will be less abrupt, giving you finer control over placement and dimensioning.

GROUP THERAPY

Group flowchart elements. Then you can drag a complex assembly around without fear of leaving any parts behind. You can do a group resize and easily fit the group where it's needed. You can alter the fill-pattern line thickness, font size, and font style (except with groups in *Cricket Draw*). With grouped objects, however, you can't reposition individual elements,

reshape polygons, or edit embedded text, so take care not to group your work too early in the process or you'll waste time ungrouping it for further editing.

When you need a series of similar objects, each with a line emerging from it or pointing into it, simply draw one object and one line and then group them and duplicate as many sets as you need.

Any application will slow down if you crowd the document with objects. With this in mind, consider dividing a large process into smaller sections. You can combine the sections onto one document later, or you can use off-page connector symbols to link them.

Borrowing an excellent concept from the flowchart-specific application *MacFlow,* you can render symbols that represent a general description of a more detailed process in thick lines, shadow them, and/or fill them with a medium-light pattern. The name of the related document (which contains the next greater level of detail) can then be typed over the symbol, hidden behind it, and finally grouped. The overlaid name will always travel with its symbol. Those who know your conventions will know where to find the hidden document reference.

Any application will slow down if you crowd the document with objects. With this in mind, consider dividing a large process into smaller sections.

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FLOWING OUT

Years ago when I first entered the software business, I handled my first IBM flowchart template. It was cute, fun to bend, and satisfying to twirl on a pencil shaft. But using it for actual flowcharting was unthinkable: "What? You want *me* to write in these little boxes?" I didn't mind the flowcharting so much, but I did mind the restrictions — and the ordeal of making changes. I was young and inexperienced, but I knew that someday I would get my revenge. I don't know, now maybe I have. Score one for the kid.

SALVATORE PARASCANDOLO IS A SYSTEMS ENGINEER WITH COMPTEK RESEARCH AND IS A MACINTOSH CONSULTANT. HE COLLECTS FLOWCHART TEMPLATES IN HIS CENTER DESK DRAWER AND OCCASIONALLY LENDS THEM OUT.

FLASH CARDS

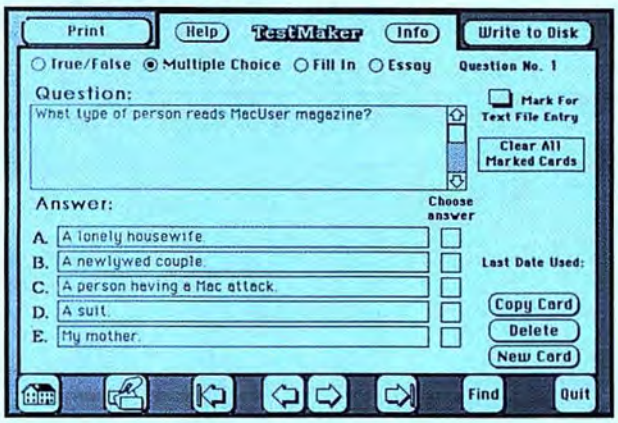
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You've come a long way, *HyperCard*. You're getting older . . . and better.

Since "Flash Cards" premiered in our December '87 issue, we've been showing you the good, the bad, and the ugly. Stacks in general are getting more sophisticated, yet we still receive many simple attempts from first-time *HyperCard* users. We've introduced you to a variety of applications — from a goldfish bowl and an infinite number of Rolodex variations to a tour of the brain and a video applications interface. Some of our Flash Cards' listings have graduated to Quick Clicks and full feature articles.

You can find the shareware and freeware stacks on bulletin boards and the commercial stacks at your local software emporium. If you create a stack that you think others will be interested in, send it to Flash Cards, c/o *MacUser*, 950 Tower Lane, 18th floor, Foster City, CA 94404. We can't promise to show your stack, and we can't return your disk.

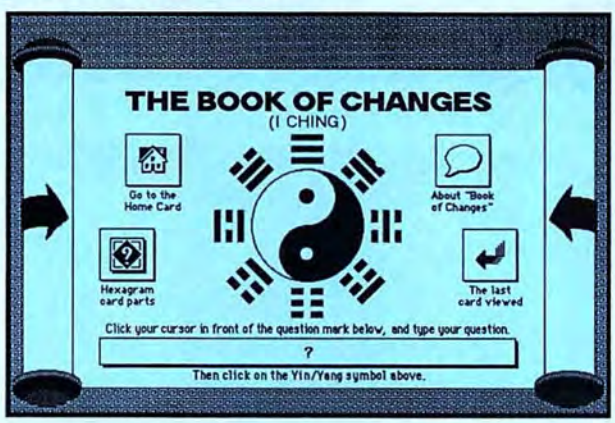
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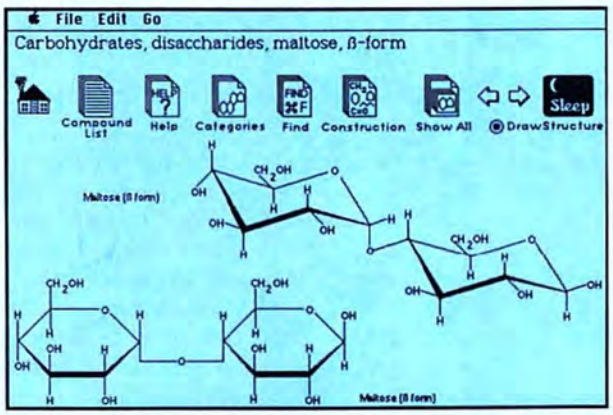
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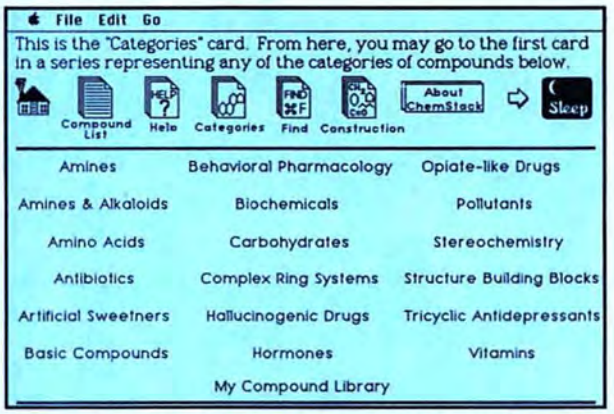




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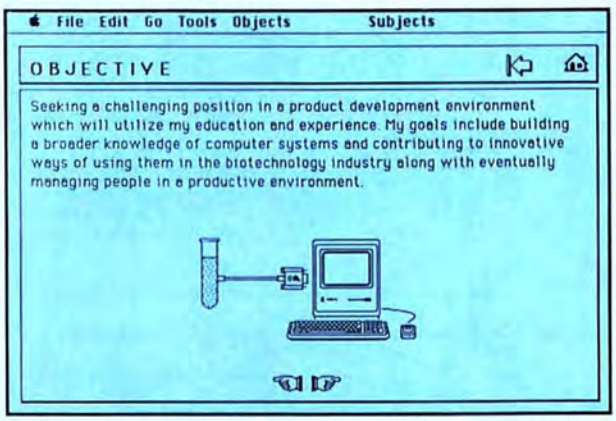
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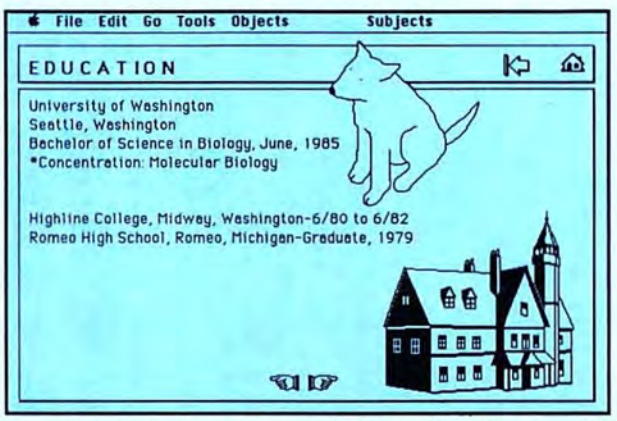




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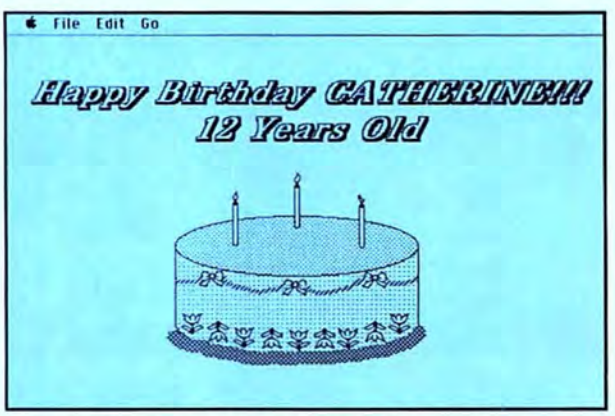




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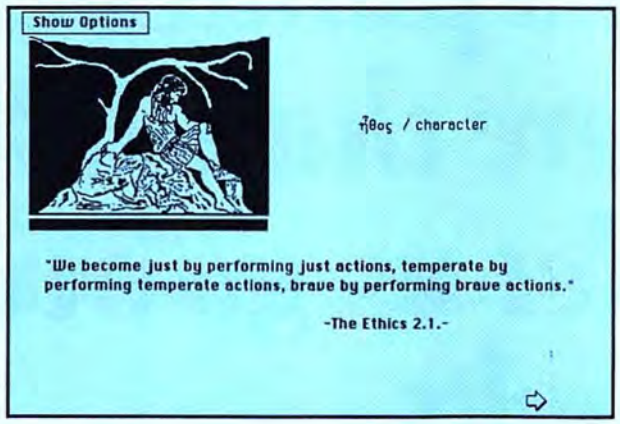


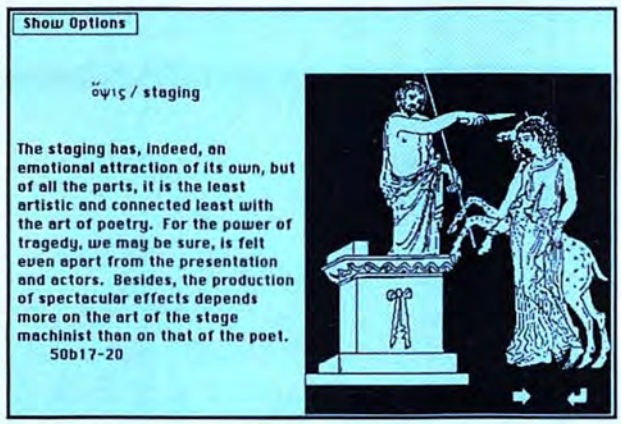


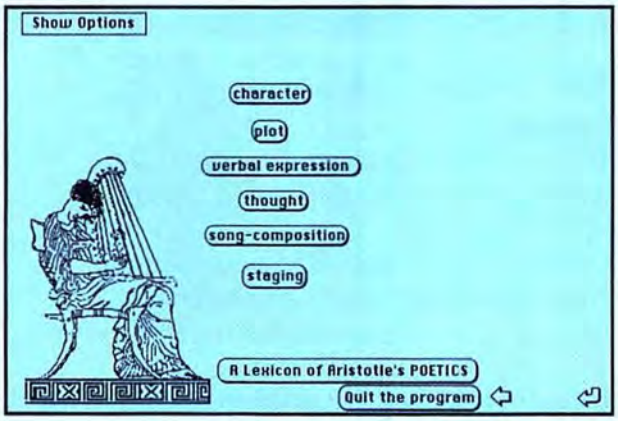
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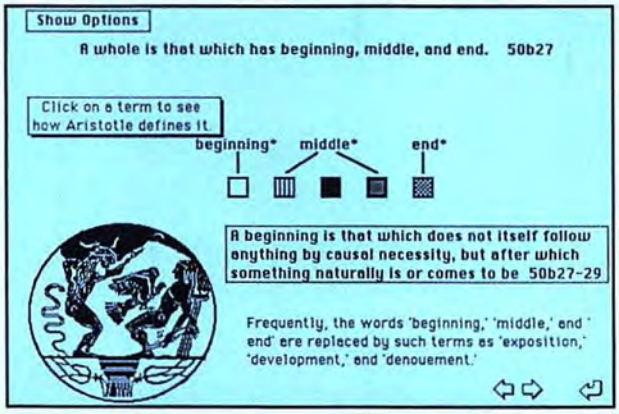
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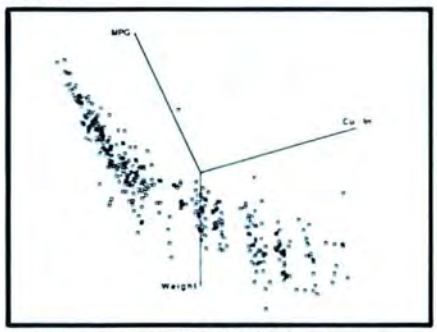


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ford torino	17	8	302	140	3449	11	1971
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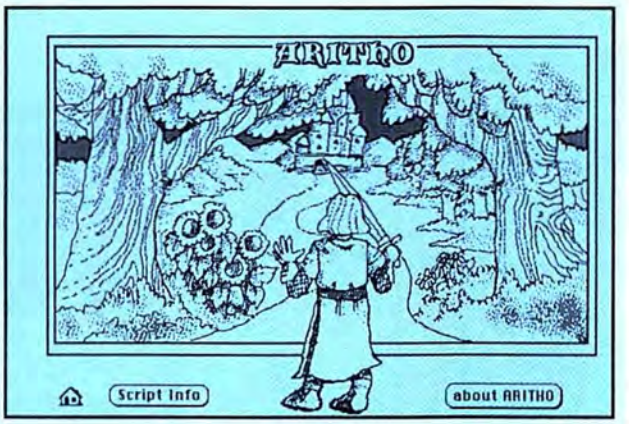
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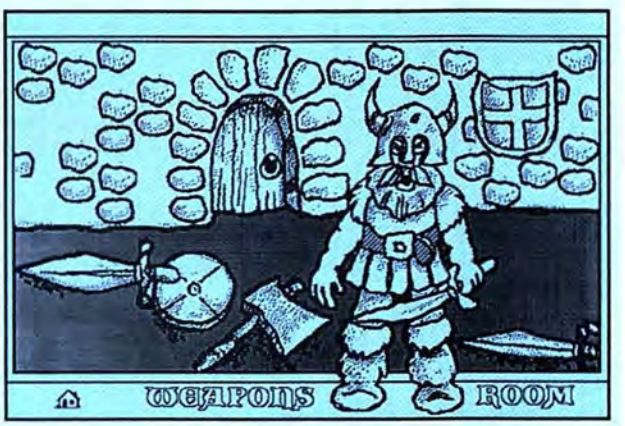
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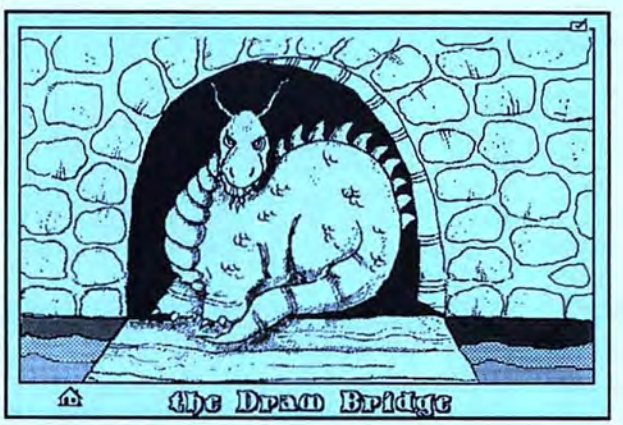
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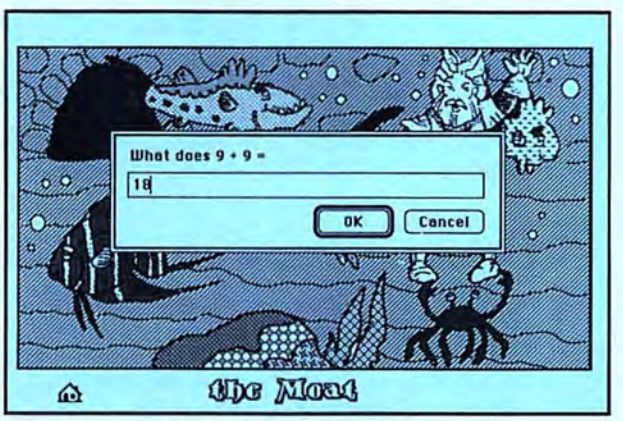
2 the Rescue

Children can succeed at this adventure game by adding and subtracting their way through the castle maze to rescue Princess Mathena from the evil King Calculus. You can customize this program by changing numbers or going from addition and subtraction to multiplication and division. *Aritho* is shareware, available from Marc Harrison, 14706 'O' Circle, Omaha, NE 68137, for $15.







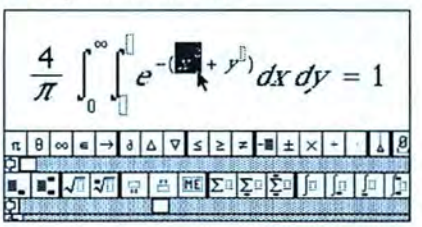


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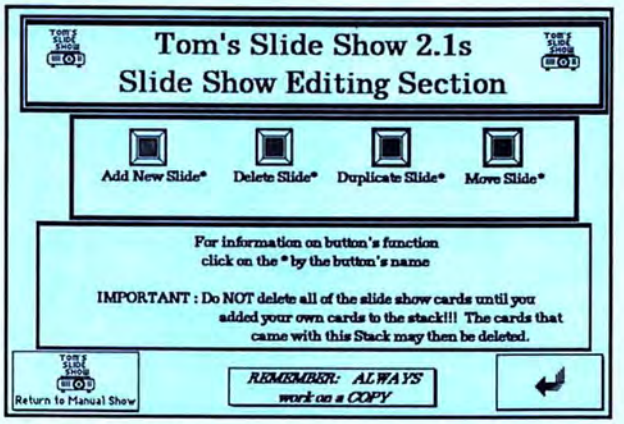


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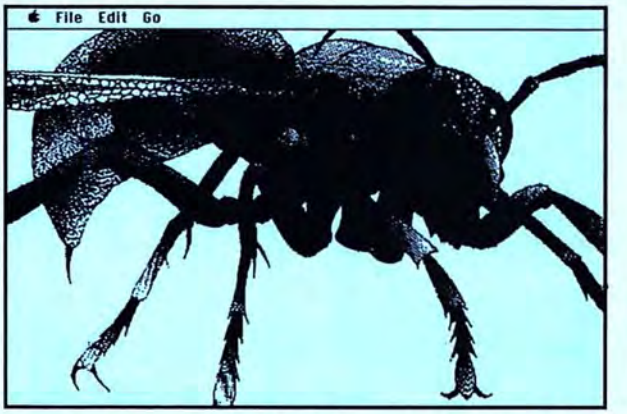
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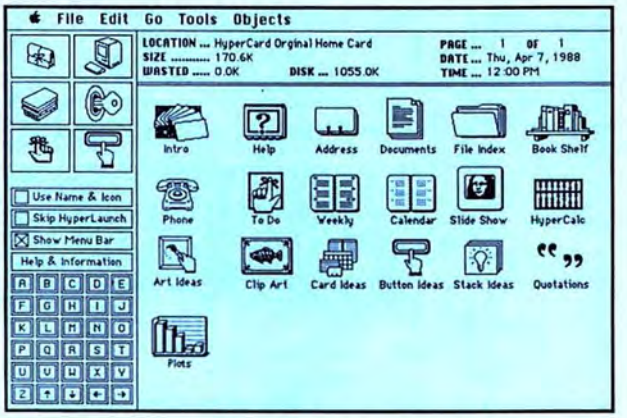
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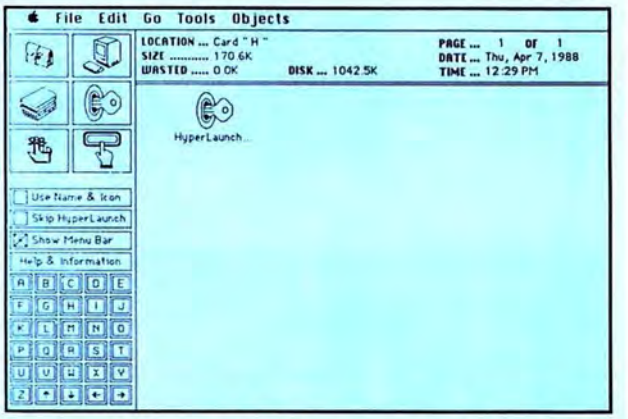
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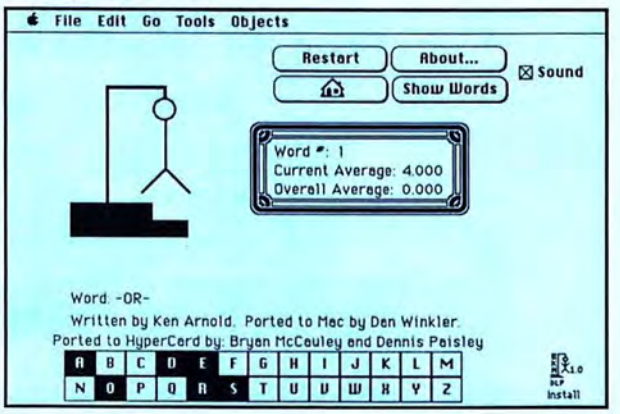
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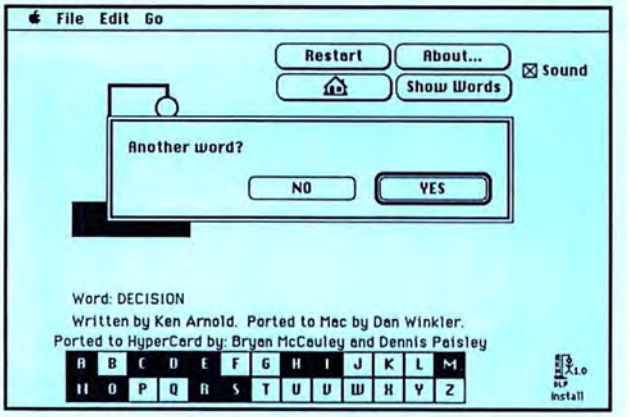
Organize all your *HyperCard* stackware, stand-alone applications, documents, and DAs with *Portfolio*, a Home-stack replacement and *Finder* substitute. Use *HyperLaunch* to launch and return from any application or document in the *HyperLaunch* directory. *Portfolio* was created by Bob Davis, 7250 York Avenue South, Suite 317, Edina, MN 55435. It's available on CompuServe for $10, or send a check for the amount of $15 to Bob Davis.



Hanging Around

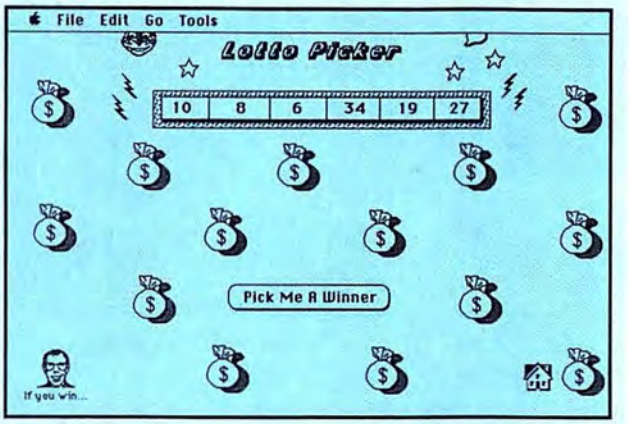


An old favorite goes high tech — put away your paper and play *Hangman* on your Mac. *Hangman* is shareware, created by Bryan McCauley and Dennis Paisley. It is available for $5. Write 103 East Concord Drive, Lebanon, OH 45036.



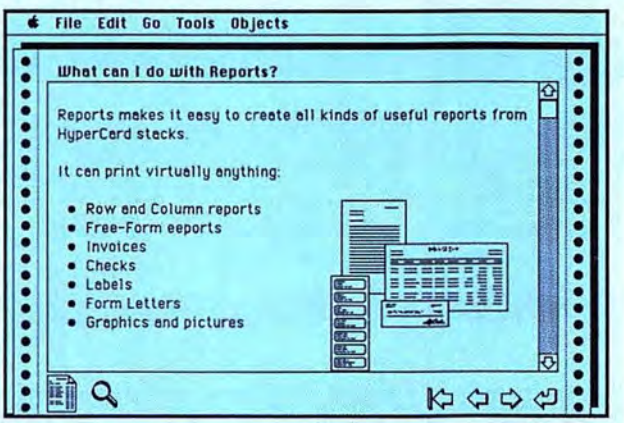
Winners, Keepers . . .

. . . Losers, weepers. If you haven't won the Lotto using your numbers, you have nothing to lose by letting Tom Hardy's *Lotto Picker* stack generate numbers for you. This program is freeware, but if you win you may want to share your loot with Tom, 443 15th Avenue, No. 5, San Francisco, CA 94118.



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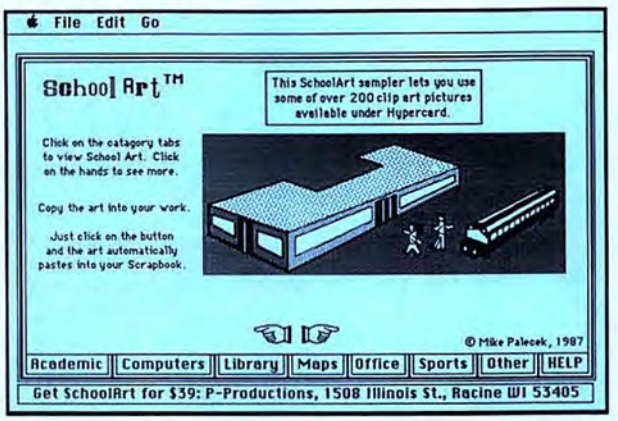
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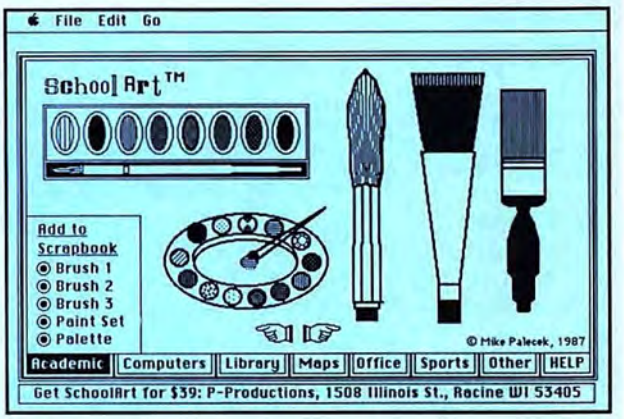
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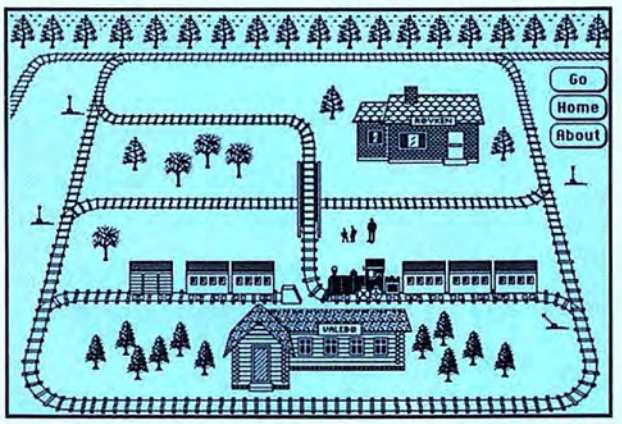
School Clips

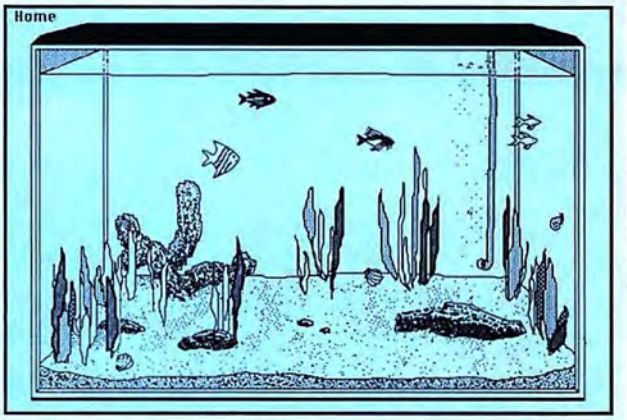




A collection of 200 images of school-related topics, from academics to sports. Very useful for educational publications. *School Art* from P-Productions, 1508 Illinois Street, Racine, WI 53405.

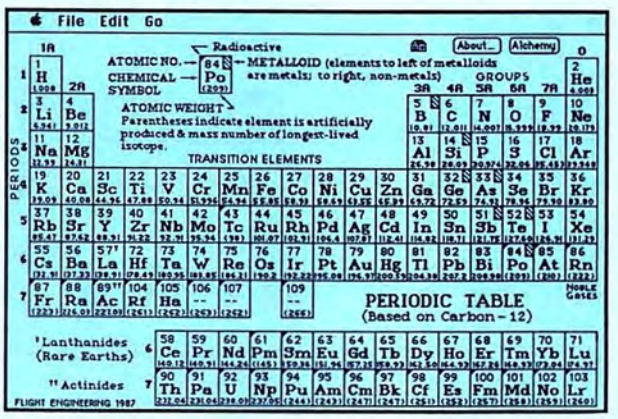
Just for Fun

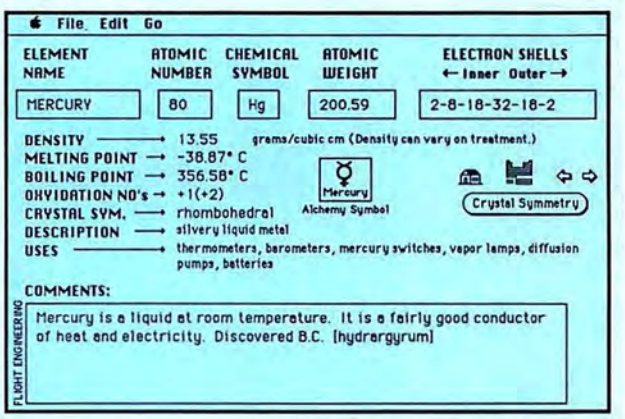




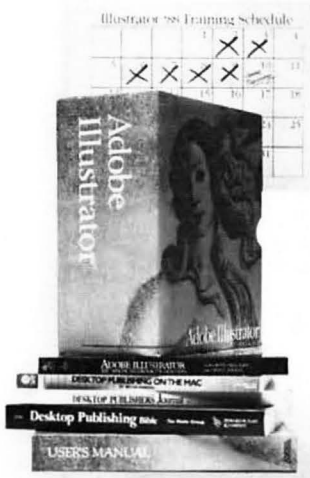
This Mac user developed *Choo-Choo Train* and *Aquarium* for his own pleasure — a graphic treat for the rest of us, and a tranquilizer without side effects. From Nils Erik Grande, 2686 Lom, Norway.

It's Elementary





Click on an element (mercury, for example) in the Periodic Table for pertinent information such as density, melting point, description, and uses. *Elements* is freeware from Jim Walker, Flight Engineering, P. O. 661133, Miami Springs, FL 33266.



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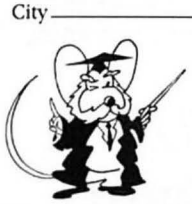
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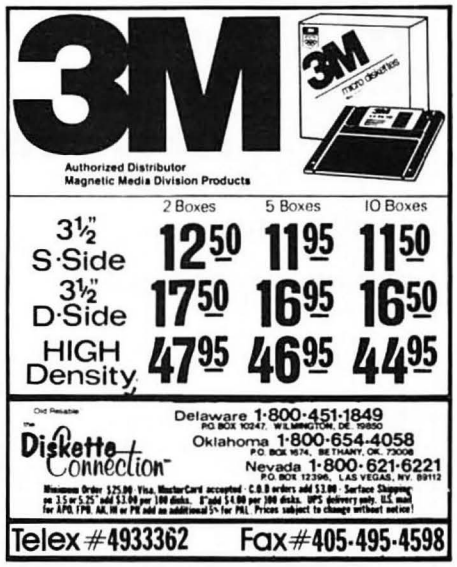
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INTEGRATED SOFTWARE

Jazz provides well-integrated modules for word processing, graphs, worksheets, databases, and communications. HotView is best feature. Requires 512K+ and external drive. Version 1A requires 400K drive. $395. Lotus, 55 Cambridge Parkway, Cambridge, MA 02142. CP (Prem)

Microsoft Works is an integrated application that includes word processing, database, spreadsheet, and telecommunications functions. The telecommunications module includes both background up- and downloading. $295. Microsoft, 16011 NE 36th Way, Redmond, WA 98073-9717. NCP (Oct 86) ★'86 Eddy

Trapeze (version 2.0) is a powerful presentation worksheet that combines mathematical functions and graphic representation. The interface, which consists of an icon bar, can be awkward to use. Mac II and color supported. $395. Access Technology, 555C Heritage Harbor, Monterey, CA 93940. NCP (Dec 87)

BUSINESS ACCOUNTING

Accountant, Inc. V2.0 integrates accounts payable, accounts receivable, general ledger, and inventory modules. Prints checks, purchase orders, invoices, customized reports. Bare bones accounting system limited in size and scope, but ease of use and integration make it suitable for small businesses. Requires 512K+. $299. SoftSync, 162 Madison Ave., New York, NY 10016. NCP (Oct 87)

Back to Basics Accounting is a powerful double-entry accounting software package for the small business user with GL, AR, and AP modules. Exhaustive manual with numerous examples. Report capabilities are excellent. $199. Peachtree, 4355 Shackleford Rd., Norcross, GA 30093. NCP (May 87)

BPI General Accounting is an easy-to-use system. Six journals, AR, AP, Payroll, and GL on one disk. Offset amounts automatically post to ledgers. Up to 8000 accounts. Detailed records, wide range of reports. *Switcher* and HFS compatible. $249. Requires 512K+. BPI Systems, 3001 Bee Cave Rd., Austin, TX 78746. NCP (Aug 86)

CheckMark is a Ledger with five preset journals: Cash Disbursements, Receipts, General, Sales, and Purchases. Menus and data entry are very straightforward. Flexible summary reports are built in; customer and vendor info is very minimal. $395. CheckMark Software, PO Box 860, Fort Collins, CO 80522. NCP (Dec 85)

Insight is a high-powered accounting program for the small-to-medium-sized business. Modules include Accounts Receivable, Payables, and General Ledger; others are in the works. Requires 512K and hard disk. $595. Layered, 529 Main St., Boston, MA 02129. NCP (Dec 86) ★'86 Eddy

Rags to Riches integrated accounting modules (General Ledger and Accounts Receivable) uses Mac interface to the hilt. Information entered in one window automatically transfers. Detailed, flexible report options. Very easy to use, but it can be confusing with several windows on screen. Requires 512K+ and printer. $199.95 per module. Chang Labs, 5300 Stevens Creek Blvd., San Jose, CA 95129. NCP (Dec 85)

Rags to Riches Professional Billing tracks and bills professional services. Batches activities for individual timekeepers. Use as standalone, or integrate with *R to R* modules. Requires 512K+, printer. $399.95. Chang Labs, 5300 Stevens Creek Blvd., San Jose, CA 95129. NCP (Feb 87)

Strictly Business General Ledger features clear, well-outlined setup procedures and operations. Very flexible, up to 99 profit centers with up to 100 departments each, and customized reports. Program print spools. Requires 512K+, printer and external drive. $395. Future Design, 13681 Williamette Dr., Westminster, CA 92683. NCP (Dec 85) ★'85 Eddy

PERSONAL FINANCE

Dollars & Sense is a bookkeeping program. Easy to use, with a good manual and excellent on-screen help. Will handle up to 120 separate accounts or money categories. Uses standard double-entry accounting techniques. Will work on 128K. $149.95. Monogram, 8295 S. La Cienega Blvd., Inglewood, CA 90301. CP (Mar 87)

Easy Checks puts your check register (or credit card records or any other simple financial account) into a desk accessory. Creating formats is rough, can't save reports to disk and there's no LaserWriter support. Requires 512K+. $44.95. PAR Software, PO Box 1089, Vancouver, WA 98666. NCP (Apr 88)

MINIFINDERS



MacInTax is an excellent tool for preparing tax forms. Intuitive, easy
★★★★★ to use. Accepts data from leading personal finance programs. Good built-in help. Liberal upgrade policy for current owners. California forms set also available. $119 federal; $65 California. SoftView, 4820 Adohr Lane, Suite F, Camarillo, CA 93010. NCP (Mar 87) ★'86 Eddy

MacMoney is a financial manager that uses information gleaned
★★★★ from your checks and deposit slips. Produces a variety of reports and graphs. Requires 512KE and printer. Version 3.1 reviewed. $119.95. Survivor Software, 11222 La Cienega Blvd., Inglewood, CA 90304. NCP (Jul 88) ★'86 Eddy

Market Pro is a comprehensive portfolio management program for
★★★★ the generation of fundamental data as well as technical charts and graphs. Requires 512K+, external drive, and Hayes-compatible modem. $395. Pro Plus Software, 2830 E. Brown Rd., Mesa, AZ 85203. NCP (Nov 86)

DATABASES

Business Filevision is a masterpiece of Macintosh programming,
★★★★ the only true graphic database on any micro. Much more powerful than the original, accepts *MacPaint* graphics. $395. Marvelin, 3420 Ocean Park Blvd., Santa Monica, CA 90405. NCP (Feb 86)

C.A.T. is a dedicated relational database for managing contacts,
★★★★ activities and time. Difficult to learn, but easy to use. Its rigid structure takes some getting used to, but links between types of data make it easy to keep track of important people and events. $299.95. Chang Laboratories, 5300 Stevens Creek Blvd., San Jose, CA 95129. NCP (Nov 87)

dBase Mac is a relational DBMS that includes a structured
★★★★ programming language to develop standalone applications. Palette icons as alternatives to menu commands will help novice users. Requires 1M+. $495. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319. NCP (Feb 88)

Double Helix II is a powerful database that supports a multiuser
★★★★½ environment with an upgrade. Uses an icon-based development system for easy creation of databases. $595, single user version. Odesta, 4084 Commercial Blvd., Northbrook, Ill 60062. NCP (Apr 88)

File is a flexible data manager. Creates files for a variety of data,
★★★★ including simple graphics. Files are created in simple row/column format, but reports and forms are easily customized. $195. Microsoft, 16011 NE 36th Way, Redmond, WA 98073-9717. CP

FileMaker Plus retains features of *FileMaker* and reads *FileMaker*
★★★★★ data, also displays up to 8 files, uses "lookup" to retrieve data from other files. Enhanced calculation with many additional functions. Scripts automate a sequence of actions. Requires 512K+. $295. Nashoba Systems, 1157 Triton Dr., Foster City, CA 94404. NCP (Nov 86) ★'86 Eddy

4th Dimension is a versatile tool that creates standalone relational
★★★★½ databases. Design and layout environments allow easy linking of information. Robust. Pascal-like procedure language. $695. Acius, 20300 Stevens Creek Blvd., Cupertino, CA 95014. NCP (Nov 87) ★'87 Eddy

MacDewey! (version 2.5) is a cataloging program featuring the
★★★ Dewey Decimal Classification system. Uses predefined fill-in-the-blank fields to create catalog cards. Suffers from bugs in search routines and the inability to distinguish first names. Not for professionals; home libraries might benefit. $79.95. Mousetrap Software, 336 Coleman Dr., Monroeville, PA 15146. NCP (Nov 87)

MacRelax is a relational list manager that stores data in a column
★★ format. Files can be related by sharing a common field. Flexible design for reports. Screen display is sometimes strange. Easy to use but not obvious to learn. $59.95. 1M+ required. Arrays, 6711 Valjean Ave., Van Nuys, CA 91406. NCP (Jan 87)

Omnis 3 is a power database, featuring concurrent multiple file
★★★★ management. Can handle 24 files, 12 at a time, and is fully relational. Create custom environments, including user-defined menus, commands, and dialogs. $495. Blythe, 2929 Campus Dr., San Mateo, CA 94403. NCP (Mar 86)

OverVUE is a power-packed relational database that has extensive
★★★★½ sorting, summarizing, and report generation capacity. Has macros, and a charting function. Good manual. It can exchange files with a very wide variety of other programs (including IBM software). $295. ProVUE, 222 22nd St., Huntington Beach, CA 92648. NCP (Nov 85) ★'85 Eddy

Professional Bibliographic System is a specialized database for
★★★★ storing and retrieving bibliographies. Redesigned templates (20) simplify creation. Version 2.6 offers improved speed, flexible formatting. $295. Personal Bibliographic Software, Box 4250, Ann Arbor, MI 48106. CP (Feb 87)

Record Holder is a flexible, easy-to-use form-oriented data manag-
★★★★ er. Setup is particularly simple and the search features are powerful. $69.95. Software Discoveries, 137 Krawski Dr., South Windsor, CT 06074. NCP (Apr 86) ★'87 Eddy

Reflex For The Mac is a flexible relational database. Excellent
★★★★½ report generator gives full control over appearance, style of output. Requires 512K+, second drive, or hard disk. $99.95. Borland International, 4585 Scotts Valley Dr., Scotts Valley, CA 95066. NCP (Dec 86) ★'86 Eddy

Reflex Plus is a relational database with "smart" entry, and report
★★★★ design, but no overall programming facility. Simple to set up, yet fast. Graphic capabilities are quite limited. Version 1.0 reviewed. $279. Borland/Analytica, 4585 Scotts Valley Dr., Scotts Valley, CA 95066-9987. NCP (Feb 88)

Writer's Workshop maintains orderly records for writers. It
★★★½ can track manuscripts, income, and publisher. Based on and includes *Runtime Helix*. $99.95. Futuresoft System Designs, PO Box 132, New York, NY 10012. NCP (Apr 87)

NUMBER CRUNCHING

DesignScope is a construction kit for digital and analog circuits. Up
★★★★ to 254 components can be utilized in a single circuit, and the equivalent of a dual trace oscilloscope plots output in real-time. Good for testing circuitry without touching a breadboard. $249.95. BrainPower, 24009 Ventura Blvd., Calabasas, CA 91302. NCP (Nov 86)

Excel is THE power spreadsheet. Of the Mac, of the world. Has 256-
★★★★★ column by 16,384-row capability. Features include a powerful macro function (with a recorder to make creation simple) and elaborate charting facilities. 512K+ Mac and external drive required. $395. Microsoft, 16011 NE 36th Way, Redmond, WA 98073-9717. NCP (Prem) ★'85 Eddy

MacCalc is a fast, competent, full-featured spreadsheet with
★★★★ impressive built-in functions, font control, on-line help, ability to expand columns and rows, and read/write SYLK or WKS files. The worksheet is 125 columns by 999 rows. A very flexible, pure spreadsheet. $139. Bravo Technologies, c/o DPAS, PO Box T, Gilroy, CA 95021. NCP (Sep 86) ★'86 Eddy

MacSpin is a unique and powerful graphic data analysis program.
★★★★ Handles multivariate data in a highly visual manner. Nothing else like it for any micro. $199.95. D^2 Software, PO Box 9546, Austin, TX 78766-9546. CP (Jun 86) ★'87 Eddy

Mindsight is a professional level decision support and business
★★★★ planning package. Can work with IFPS on mainframes, and is able to transmit models in both directions. Powerful and easy to use. Requires 512K+. $249. Execucom Systems, PO Box 9758, Austin, TX 78766. CP (Dec 86)

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Multiplan, the first Mac product from someone other than Apple, is beginning to show its age. Still a very capable basic spreadsheet with simple sorting, 63 columns by 255 rows, many built-in functions, other standard spreadsheet features. $195. Microsoft, 16011 NE 36th Way, Redmond, WA 98073-9717. CP (Mar 86)

101 Macros for Excel offers all the power of macros without having to learn how to write them. Some gems include a macro to transpose rows and columns, and a search and replace macro. Requires *Excel*. $69.95. Macropac International, 19855 Stevens Creek Blvd., Cupertino, CA 95014. NCP (Jul 88)

Parameter Manager is a data manager, incorporating integrated scheduling, statistics, and graphics. It has solid spreadsheet, calendar, and database functions and reports can be customized using other software. *Parameter Manager* can also import data from *Excel* or *Lotus 1-2-3*. $495. SMS, 651 River Oaks Parkway, San Jose, CA 95134. NCP (Jul 87)

StatView 512+ is a very intuitive statistical analysis program with tools needed to understand any set of data. Holds data in a spreadsheet-like form. Full-featured, fast, and accurate. Extremely wide range of analyses possible. Requires 512K+ and 800K of disk space to operate. $349.95. BrainPower, 24009 Ventura Blvd., Calabasas, CA 91302. NCP (Dec 86)

GRAPHICS & DESIGN

CalendarMaker creates monthly calendars in a variety of formats. Users can incorporate their art and daily notes. Note files can be imported from a variety of DA calendars and outliners. Shareware and prelicensed versions available. $49.95 CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Dec 86)

Canvas is a Draw and Paint program that uses QuickDraw as its output language. Full of features, including free rotation and one-and-two-point perspective. Also has graphics macro commands, unusual in a program this inexpensive. $295. Deneba, 7855 N.W. 12th St., Suite 202, Miami, FL 33126. NCP (Jan 88)

Chart can easily create area, bar, column, line, pie, scatter, and combination charts. A total of 42 styles are provided. Limited to 100 data items (64 in a series) on a 128K Mac, approximately twice that on a 512K Mac. $125. Microsoft, 16011 NE 36th Way, Redmond, WA 98073-9717. CP

ClickArt Special Effects is a *MacPaint* enhancement desk accessory. Allows the user to distort, stretch, rotate, and use perspective on *MacPaint* documents. A necessary addition for all serious users of *MacPaint*. $49.95. T/Maker, 1973 Landings Dr., Mountain View, CA 94043. NCP (Apr 86)

ColorPrint allows you to print *FullPaint*, *MacPaint*, *MacDraw*, and *MacDraft* documents in color using the ImageWriter II or ImageWriter I. *Paint* files set up as overlays are read into *ColorPrint*, and the program controls proper positioning registration. $29.95. I/O Design, PO Box 156, Exton, PA 19241. NCP (Mar 86)

Comic Strip Factory is an assembly program for creating comic strips. Includes a database of parts for various characters and backgrounds for panels. Good text editing in balloons. Can import and export in *MacPaint* format. $69.95. Foundation Publishing, 5100 Eden Ave., Edina, MN 55436. NCP (Dec 87)

Cricket Draw is an object-oriented drawing program that will produce stunning, high-quality output. Designed to print on PostScript-compatible devices, such as the LaserWriter. Making shadows and flowing fountain effects is just a point and click away. $295. Cricket Software, 30 Valley Stream Pkwy., Malvern, PA 19355. NCP (May 87)

Cricket Graph easily generates 12 graph types. Multiple windows can be displayed. *Graph* prints in up to 8 colors with up to 16 patterns. Self-generating macro formatting. *Switcher*, HFS, LaserWriter, and plotter compatible. $195. Cricket Software, 30 Valley Stream Pkwy., Malvern, PA 19355. NCP (Jun 86) ★'86 Eddy

Crystal Paint creates an electronic kaleidoscope. It is *MacPaint*'s Brush Mirrors gone wild in a small, simple, yet wonderful application. Does not work in color on Mac II. *MultiFinder* friendly. Requires 512K+. $49.95. Great Wave Software, 5353 Scotts Valley Dr., Scotts Valley, CA 95066. NCP (Feb 88)

DeskPaint is a full-blown paint program as a desk accessory. Allows you to spruce up a graphic while in another application. Imports and exports *MacPaint* and TIFF images. Great for DTP, but not enough features to rival the leaders in paint programs. Zedcor, 4500 E. Speedway, Tucson, AZ 85712-5305. NCP (Mar 88)

"Draw it again, Sam..." (v. 1.03) is an object-oriented graphics program, like *MacDraw*, that adds such useful wrinkles as layered drawing, on-screen libraries, and color. Manual is weak. Requires 512K+ and an 800K disk drive. $150. Aba Software, PO Box 850, Frazer, PA 19355. NCP (Feb 88)

Easy3D is a three-dimensional, solid modeling masterpiece. Four variable light sources, powerful sculpting tools, and an exquisite user interface make this a must-have for graphics enthusiasts. Requires 512K+. $149. Enabling Technologies, 600 S. Dearborn, Chicago, IL 60605. NCP (May 86)

FastForms! Construction Kit is both a fast and efficient business forms creator (a drawing program) and a specialized application (and DA) to fill out the data fields in your forms. $149 (US). Shana Enterprises, Advanced Technology Center #105, 9650-20 Ave. Edmonton, Alberta T6N 1G1, Canada. NCP (Nov 87)

Fluent Fonts is a two-disk collection of fonts. Forty-nine different items are included. All install easily in user systems. Most are well executed and some are extraordinarily nice. This is a real bargain for font lovers. $49.95. CasadyWare, PO Box 223779, Carmel, CA 93922. NCP

Fontastic is the best font editor now available for the Mac. Features a large editing window with a grid to make positioning easy. Select letters to edit by clicking on a matrix of the font. Allows scaling of existing fonts and previewing the various styles. $49.95. Altsys, PO Box 865410, Plano, TX 75086. NCP (Dec 85)

Fontographer is a complex, but excellent laser font creator. The fonts created have 300 bits-per-inch resolution. The fonts are actually downloadable PostScript files. $395. Altsys, PO Box 865410, Plano, TX 75086. CP

FullPaint is an expanded version of *MacPaint*. Features include full-screen drawing, multiple documents opening simultaneously, brush editing, movable tool palettes, special text effects, and much more. It fills the gaps left by *MacPaint*. $99.95. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319. NCP (Jun 86) ★'86 Eddy

GraphicWorks 1.1 is a powerful drawing and painting program that creates high-resolution bit-maps. Easels contain graphics, balloons hold text, and both reside on panels. Graphic primitives are now a separate tool. $149.95. Mindscape, 3444 Dundee Rd., Northbrook, IL 60062. NCP (Oct 87)

GridMaker is a tool for artists who use perspective. The program automatically generates a series of three-dimensional plane sets that can be pasted into *MacDraw*. Sizes and viewing vantage points are easily modified. $49. FolkStone Design, PO Box 86982, North Vancouver BC V7L 4P6, Canada. NCP (Nov 86)

Illustrator is a professional-level graphics program. Unique and powerful drawing technique. Program uses templates for

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precise and detailed art work. Requires 1M+. $495. Adobe Systems, 1870 Embarcadero Rd., Palo Alto, CA 94303. CP until registered (Jul 87)

Image Studio puts a photo-retouching lab on the desktop. Editable brushes let you modify digitized images in 65 gray levels. Requires 1M+ and two 800K disk drives. Mac II and *MultiFinder* friendly. Version 1.0 reviewed. $495. Letraset USA, 40 Eisenhower Dr., Paramus, NJ 07653. NCP (Jun 88)

Images with Impact! brings clip art out of the turn-of-the-century woodcut style and into a modern graphic sensibility. "Graphics and Symbols 1" is the first in a series. Requires a program that reads Encapsulated PostScript (EPS) files. $99.95. 3G Graphics, 11410 NE 124th St., Kirkland, WA 98034. NCP (Jun 88)

Japanese Clip Art is a two-disk set of extraordinary Japanese clip art. Consists of *MacPaint* documents and separate fonts. Volume I, Heaven, covers mythological subjects; Volume II, Earth, has secular subject matters. $79.95 each volume; $149.95 set. Qualitas Trading, 6907 Norfolk Rd., Berkeley, CA 94705. NCP (Apr 87)

LaserFonts are new fonts for the LaserWriter. Users download them to their machines. Very high quality and very simple to use. *Willamette* looks like Avant Garde. *MicroFonts* provides tiny, expanded, and condensed versions of the LaserWriter's own fonts. $34.95 to $44.95 each. Century Software, 2483 Hearst, #175, Berkeley, CA 94709. NCP

LaserPaint's clumsy interface makes it a slow program. There's good laser output, if you persevere through the creation of a document. The support is scads better than the documentation, which is lousy. Version 1.1.4. $495. LaserWare, PO Box 668, San Rafael, CA 94915. CP (Jan 88)

Lasertalk is a PostScript programming tool that establishes interactive contact with laser printers. Preview window and on-line help make it a powerful tool. Requires 1M+ and a PostScript Printer. $249. Emerald City Software, PO Box 2103, Menlo Park, CA 94026. CP until registered (May 88)

The Mac Art Dept. is a collection of over 150 graphic images ranging from foods to hands holding signs to borders. Best suited for letterheads, memos, other business use. $39.95. Simon & Schuster, Computer Software Div., 1 Gulf + Western Plaza, New York, NY 10023. NCP (Mar 86)

Mac-a-Mug is an Identikit-type program for creating faces from facial feature files. Uses scroll bars that are slow and jerky. Lots of creative fun. 1M+ Mac required. $59.95. Shaherazam, PO Box 26731, Milwaukee, WI 53226. CP (Jul 86)

MacCalligraphy is the best simulation of brush painting in any graphics program. User-designed Seals and Touches enable you to design your own signature tool and the style of brush you use. Comes with a clip art disk. $175. Qualitas Trading, 6907 Norfolk Rd., Berkeley, CA 94705. NCP (Feb 88)

MacDraft is an object-oriented graphics program. It sports advanced features such as variable scaling, single degree rotation, complex arcs, and a FatBits-like magnification mode. Best used to complement *MacDraw*, not replace it. $269. Innovative Data Design, 2280 Bates Ave., Concord, CA 94520. NCP (Feb 86)

MacDraw is an object-oriented structured graphics program. Can be used to design forms, create presentation materials, and do technical illustrations. Drawing sizes up to 8 feet by 10 feet are possible. Text can be easily generated and integrated in the graphics. $195. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (Nov 85) ★'85 Eddy

MacModel is an economical 3D package with shading. Somewhat sketchy Mac interface, shading speed slow (but acceptable), grainy image resolution. On-line help screens are a welcome addition. Frequent updates and low price make this a reasonably good buy. $40. A.P.P.L.E. CO-OP, 290 SW 43rd St., Renton, WA 98055. NCP (Aug 86)

MacPaint hasn't lost its shine after all these years. Still one of the best freehand graphics tools. Version 2.0 supports multiple windows, design templates, and a magic eraser to correct corrections. Requires 512K and second disk drive. $125. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (Jul 88) ★'85,'87 Eddy

Mac3D 2.0 is a feature-laden 3D program with a *MacDraw*-like interface. PostScript-resolution shading with six variable light sources, user-definable tools, and many more features make this a powerhouse. $249. Challenger Software, 18350 Kedzie Ave., Homewood, IL 60430. NCP (Jan 87)

MapMaker produces maps and analyses of related geographical data. Additional data disks available. Documentation could be better. Requires 512K+; 2nd drive recommended. $295. Select Micro Systems, 40 Triangle Ctr., Yorktown Heights, NY 10598. NCP (Jan 87)

MGMS: Professional CAD for Macintosh offers more than 200 functions. Very complete, capable program. Groups, Dimension, Libraries, etc., are standard. Sometimes confusing — designed for experienced, professional CAD user, not the novice. Full plotter support. 512K+. $799. Micro CAD/CAM, 3230 Overland Ave., Los Angeles, CA 90034. NCP (Nov 87) ★'87 Eddy

MiniCad V3.0 is a pro level CAD package. Vast array of features, many accessible only through Command/Shift/Option key combinations. Works in 2D or 3D with easy transition from one to the other. *MacDraw*-like interface makes it easy to learn and use. Requires 512K+. Diehl Graphsoft, 8370 Court Ave., Suite 202, Ellicott City, MD 21043. CP (Oct 87)

Phoenix 3D is an economical 3D drawing package, with features that belong in a more expensive program. Multiple light sources, fine object placement and orientation control, and a good selection of shapes. $49.95. Dreams of the Phoenix, PO Box 10273, Jacksonville, FL 32247. NCP (Oct 86)

PictureBase is a powerful graphic librarian. You can store paint and PICT formatted items and attach keywords for later search and retrieval. $69.95. Symmetry, 761 E. University Dr., Mesa, AZ 85203. NCP (Sep 87) ★'86 Eddy

PixelPaint is a color paint program with customizable palettes and lots of special effects. Slow OPEN and SAVE. Requires Mac II and 8-bit video card. $495. SuperMac Software, 295 N. Bernardo Ave., Mountain View, CA 94043. NCP (May 88)

The Print Shop makes it easy to create greeting cards, signs, banners, and letterheads. Uses its own special graphics and can import *Paint* files. Hard disk users get version 1.02 or higher. $79.95. Broderbund, 17 Paul Dr., San Rafael, CA 94903. CP (Sep 87)

Slide Show Magician 1.3 is useful for creating full screen audio-visual presentations on the Mac. Frame branching, improved editing capabilities, external cassette recorder synchronization, and digitized sound capabilities make this much more powerful than the original. $59.95. Magnum, 21115 Devonshire St., Chatsworth, CA 91311. CP (Mar 86)

Space Edit is a 3D CAD program. Display shows top, front, side, and axonometric views of an object, all at once or one at a time. Has standard CAD features plus zoom, exploded view, animated flyover. Suppression of hidden lines is very slow. Requires 1M+. $625. Abvent, 9903 Santa Monica Blvd., Beverly Hills, CA 90212. CP (Jul 87)

Storyboarder produces working animated storyboards for use in film and video production. Imports graphics from *MacPaint;* allows screen masking to simulate television, 35mm or 70mm screen widths; allows limited animation and special effects. $495. American Intelliware, PO Box 6980, Torrance, CA 90504. CP (Nov 86)

SunShine Graphics Library is a collection of 46 400K disks (to date) with a wide variety of high-quality digitized images stored as *MacPaint* files. $20/disk: discount scale for multi-

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ple purchases. SunShine, Box 4351, Austin, TX 78765. NCP (Feb 87)

SuperPaint is a powerful, easy-to-use graphics program with all the best features of *MacPaint* and *MacDraw* — and then some. LaserBits provides 300 dpi magnification and there are 40 editable brush shapes. Requires 512K+. $149.95. Silicon Beach, 9580 Black Mountain Rd., PO Box 261430, San Diego, CA 92126. NCP (Feb 87) ★'87 Eddy

TrueForm takes a scanned image of a paper form and turns it into an electronic equivalent, complete with fields for entering data. It can automatically sum numeric fields. Requires external 800K drive. $495; run-time version, $295. Spectrum Digital Systems, 2702 International Lane, Madison, WI 53704-3122. NCP (May 88)

VersaCAD is a powerful CAD program that doesn't show any of its MS-DOS roots. Excellent element manipulation, full plotter support. Library user interface is crude. Requires 1M+. $1995. VersaCad, 2124 Main Street, Huntington Beach, CA 92648. NCP (Jul 88)

VideoWorks II is an easy-to-use animation tool — the best available on the Mac. Has an Overview mode that acts as a slide show carousel for presentations. Works in color on the Mac II. $195. Requires 1M+ and an 800K drive. MacroMind, 1028 W. Wolfram, Chicago, IL 60657. NCP (Mar 88) ★'85, '87 Eddy

WetPaint consists of two 3-disk volumes of very high quality clip art. Also includes the *Art Roundup* DA, a good art browser/editor. Volume 1 or 2, $39 each; both volumes, $59. Available in *PictureBase* format for $15 extra per volume. Dubl-Click Software, 18201 Gresham St., Northridge, CA 91325. NCP (Sep 87)

World-Class Fonts! comes in two volumes of three disks each. Includes all the *Mac the Knife* fonts and a lot more, including two useful utilities. This is now the best collection of ImageWriter fonts available. Each volume: $39; both volumes: $59. Dubl-Click Software, 18201 Gresham St., Northridge, CA 91325. NCP (Dec 86)

DESKTOP PUBLISHING

Interleaf Publisher is a speedy multiuser layout system for producing large, complicated documents. Has strong global formatting ability but can't use downloadable fonts. Requires Mac II with 5M of RAM and 40M hard disk, $2495. Interleaf, 10 Canal Park, Cambridge, MA 02141. NCP (May 88)

JustText is a professional level word processor and page makeup program that generates PostScript output. Comes with a set of LaserWriter utilities that allow total manipulation of art and text. Requires LaserWriter or other PostScript compatible output device. $195. Knowledge Engineering, GPO Box 2139, New York, NY 10116. NCP (Dec 85)

MacTEX (v. 2.0) is the TeX environment of choice for hardcore TeX users on the Macintosh. Very intimidating for others. Painfully slow and visually unattractive. Requires 1M+. $750. FTL Systems, 234 Eglington Ave. East, Toronto, Ontario M4P 1K5, Canada. NCP (Apr 88)

PageMaker uses a graphics studio metaphor to make this layout program a natural for pasteup artists. Version 2.0 adds automatic kerning and hyphenation. Still the standard. Excellent documentation. Could use a global search and replace for design elements. $495. Aldus, 411 First Ave. South, Seattle, WA 98104. NCP (Oct 87) ★'85, '87 Eddy

Portfolio: Designs for Newsletters provides over 20 templates for 2-page newsletters with pre-set columns, headlines, graphics, and captions. Documentation provides excellent tutorial in page design. Requires 512K+; *PageMaker.* $79.95. Aldus, 411 First Ave. S., Suite 200, Seattle, WA 98104. NCP (May 87)

QuarkXPress is a high-end desktop publishing application. Layout is done in block format; powerful lining tool ties blocks together. $695. Quark, 200 S. Jackson, Denver, CO 80209. NCP (Sep 87)

Ragtime is an "Integrated Page Processor" with text, graphics, and built-in spreadsheet. Flow text automatically from one frame to another. Spreadsheet has a full set of functions. Excellent, easy-to-use program. Requires 512K+. $395. Orange Micro, 1400 N. Lakeview, Anaheim, CA 92807. NCP (Apr 87)

Ready, Set, Go! 4 has an elegant interface and excellent manual. Powerful text wraparounds, fast word processor with hyphenation and spelling check and custom stylesheets. Requires 1M+. $495. Letraset, 40 Eisenhower Dr., Paramus, NJ 07652. NCP (Feb 88) ★'86 Eddy

Scoop could someday be the world's best desktop publishing program, but version 1.0 isn't it. There are various ways to cause the program to bomb which need to be fixed. The manual is poorly organized and lacks tutorials. $495. Target Software, 14206 SW 136th St., Miami, FL 33186. NCP (Feb 88)

TeXtures (v. 1.0) is an implementation of TeX, the big daddy of typesetting programs. Good for people trained on mainframes in the early days. Otherwise very sticky with a high learning curve. Requires 512K+. $495. Kellerman & Smith, 534 S.W. 3rd Ave., Portland, OR 97204.. NCP (Apr 88)

COMMUNICATIONS

AppleShare is the long awaited file sharer from Apple. Software-based, *AppleShare* requires you to dedicate a Mac and a hard disk to run it. Allows users on the network to protect things from other users on the folder level. Interface to network is provided at a revised *Finder.* $799. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (May 87)

ComServe allows you to share a Hayes-compatible modem over an AppleTalk network. You can call out, but you can't call in. Works with most telecommunications packages. $195 per server. Infosphere, 4730 SW Macadam Ave., Portland, OR 97201. CP (Feb 88)

Desktop Express is a simple to use, semi-automated program for using MCI Mail and Dow Jones News/Retrieval. Performance is traded off for ease of use. Requires 512K+. $149. Dow Jones, PO Box 300, Princeton, NJ 08543. NCP (Jan 88)

HomePak is a package consisting of *HomeTerm,* an excellent, simple telecommunications program with strong macro features; *HomeFind,* an electronic filer as bad as *HomeTerm* is good; and Apple's *Edit,* a simple, non-HFS-compatible text-file editor. $49.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. NCP (Sep 86)

inBox is an easy-to-use mail system. It's called up from a desk accessory. Has a very slick interface. Dedicated Mac not required. $350 for starter set which includes one Administrator disk and three Connection disks. Additional Connections cost $125 each. Think Technologies, 135 South Rd., Bedford, MA 01730. NCP (May 87) ★'86 Eddy

inTalk comes with its own communications command language able to do unattended sessions. Supports Xmodem and MacBinary. Has a macro key function. Many sample setup documents and command language files provided. $195. Palantir, 12777 Jones Rd., Houston, TX 77070. NCP (Prem)

MacTerminal provides basic telecommunications and terminal emulation. Doesn't have macros nor any sort of auto re-dial/auto log-on capability. Best for those needing faithful VT100 or IBM 3278 emulation — it is superb at those. $125. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (Prem)

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Microphone is a high-powered terminal program that's easy
★★★★½ enough for novices. Very powerful command language allows full automation of communications, if desired. $149. Software Ventures, 2907 Claremont Ave., Berkeley, CA 94705. NCP (Jul 86) ★'86 Eddy

Microsoft Mail is an electronic mail system that runs under Apple-
★★★★½ Talk. Supports file transfers across the mail system. Full online help facility. Also includes "While you were out" messages. Desk accessory based. Prices determined by number of users licensed. One to four users, $299.95; 5 to 10 users, $499.95; 11 to 20 users, $749.95; 21 or more users, $949.95. Microsoft, 16011 NE 36th Way, Redmond, WA 98073-9717. NCP (May 87) ★'87 Eddy

Red Ryder is a full-featured telecommunications program that sup-
★★★★★ ports MacBinary, Xmodem, and Kermit. Has big screen support, auto procedure creator, and up to 30 keyboard macros. This is the cream of the crop (in late 87). $80. Freesoft, 150 Hickory Dr., Beaver Falls, PA 15010. NCP (Dec 87) ★'87 Eddy

Smartcom II balances power and ease of use. Capable of unattend-
★★★★½ ed operation and has a very powerful command language. Supports MacBinary, Xmodem, and Hayes Verification protocols. The large screen buffer can easily be archived. $149. Hayes, 5923 Peachtree Industrial Blvd., Norcross, GA 30092. NCP (Jul 86) ★'85 Eddy

Telescape is the power telecommunicator's terminal program. Can
★★★ be configured to emulate any terminal. The documentation does not adequately explain the many features. $125. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP (Jun 86)

TOPS is a file server designed to network computers with different
★★★★½ operating systems. Supports Macs, MS-DOS compatibles, and UNIX. Access to files and subdirectories is transparent to the user; they appear as Mac folders. Only handles ASCII or Text files. $149 for Mac version. $389 for PC's (comes with add-on card). TOPS, 2560 Ninth St., Berkeley, CA 94710. Serial number protected. (May 87) ★'87 Eddy

VersaTerm features include DEC VT100 and VT52, Tektronix 4014
★★★★½ graphics terminal and Data General DG200 emulation. Supports Xmodem and *MacTerminal* Xmodem protocols and MacBinary. *VersaTerm* is easy to use and well-documented. $99. Peripherals, Computers & Supplies, 2457 Perkiomen Ave., Mt. Penn, PA 19606. CP (Prem)

VersaTerm-Pro is a very powerful terminal program with several
★★★★½ special features. Does one of the best VT100 emulations available and specializes in high-quality Tektronix 4014 and 4105 emulation. A pro's tool. Requires 512K+. $295. Peripherals, Computers & Supplies, 2457 Perkiomen Ave., Mt. Penn, PA 19606. NCP (Apr 87)

WORD PROCESSORS

Document Compare allows users to compare any two *MacWrite*
★★★ 4.5, ASCII, or MDS documents. Differences in spelling, punctuation, formatting, and wording are detected. Documents can be printed out with differences highlighted. $99. Legalware, 33 Young St., Toronto, Ontario M5E 1S9, Canada. NCP (May 86)

Document Modeler can automate much of a professional office's
★★★★½ correspondence. Comes in two parts: *Template Maker* and *Document Maker.* Initial setup requires time and is complex. $299.95. Legalware, 33 Young St., Toronto, Ontario M5E 1S9, Canada. NCP (Mar 87)

Doug Clapp's Word Tools is a useful punctuation and style editing
★★★★ program. It won't turn you into a Proust, but it will help you make your writing cleaner and clearer. Word counts among different formats show discrepancies, but not to worry. Requires 512K+. $79.95 Aegis Development, 2125 Pico Blvd., Santa Monica, CA 90405. NCP (Sep 87)

Expressionist is a powerful DA that allows you to create complex
★★★★★ mathematical equations from within an application. Equation manipulation has never been easier. $79.95. Allan Bonadio Associates, 1579 Dolores St., San Francisco, CA 94110. NCP (Jul 87)

Kadmos Greek Font is a full character set of ancient Greek that
★★★½ prints on any PostScript printer. Requires learning new typing skills, but excellent quality makes it worth the effort. $85. Allotype Typographics, 1600 Packard Rd., Ann Arbor, MI 48104. NCP (Oct 87)

Laser Author is a high-powered, technically oriented word
★★★½ processor. Good math setting capability. Has style sheets, word count, and page layout capability. $199.95. Firebird

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Licensees, PO Box 49, Ramsey, NJ 07446. NCP (Mar 87)

Liberty Spell Checker is a fast, effective, interactive checker. The ★★★½ dictionary is smaller than average, but well chosen. Unfortunately, it has a few misspelled words. $59.95. DataPak, 14011 Ventura Blvd., Sherman Oaks, CA 91423. CP (Oct 86)

Lookup is an on-call, quick single word spelling checker. Designed ★★★★★ for the way writers really work. Uses the 93,000+ word *Spellswell* dictionary. $49.95. Working Software, 321 Alvarado, Suite H, Monterey, CA 93940. (Dec 87) NCP

MacGAS is a DA spelling checker with both a small and extended ★★★ dictionary. Its best point is the excellent thesaurus, provides antonyms & glossary. A slow checker. $99. EnterSet, 2380 Ellsworth, Berkeley, CA 94720. CP (Oct 86)

MacProof is a grammar, style, and spelling checker that's ★★★★½ like having your own personal copy editor. Grammar rules are fixed, and you may not agree with the choices. The program only suggests corrections, it doesn't make them for you. And the checking process can be slow if your document is long. $195 for standalone version; $2500 for networked version. Automated Language Processing Systems, 190 West 800 North, Provo, UT 84604. NCP (Apr 87)

Macspell+ (version 1.10) is a spelling checker that installs as a ★★★★ desk accessory. Works easily with *MacWrite* 4.5 and 2.2 and *Word,* but has some drawbacks. New version just available. Requires 512K+, two drives or hard disk. $99. Creighton Development, 16 Hughes St., Irvine, CA 92718. NCP

MacWrite is starting to show its age. While still a good, basic ★★★½ program, it's out-performed by its competition. Probably enough for the occasional user. Version 5.0 includes Command key equivalents and spell checker. Requires 512KE+. $125. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (Jun 88) ★'85 Eddy

MergeWrite is a mail merge program for *MacWrite* (also works with ★★★½ ASCII files). Program combines names and addresses from a data file into predefined fields in a form letter. Also allows simple conditional IF-THEN-ELSE equations. $49.95. Software Discoveries, 137 Krawski Dr., South Windsor, CT 06074. NCP (Dec 87)

MindWrite integrates outlining and word processing better than ★★★★ anyone. Version 1.1 fixes many problems of the earlier version. Sophisticated search and select options. Unimpressive speed. $295. Access Technology, 555C Heritage Harbor, Monterey, CA 93940. NCP (Feb 88)

QUED/M (v. 2.01) is an excellent text editor that saves docu- ★★★★½ ments in a form readable by most computers and printers. Doesn't support graphics or multiple fonts. Programming language allows creation of database. $129. Paragon Concepts, 4954 Sun Valley Rd., Del Mar, CA 92014. NCP (Mar 88)

QuickWord is a word processing accessory that adds sophisticated ★★★½ glossaries to *MacWrite.* Simple to install and use, yet powerful and efficient. $49.95. EnterSet, 2380 Ellsworth, Berkeley, CA 94720. NCP

Scriptor is designed for producing standard format scripts. Starts ★★★★ with a *Word* document. As you change your *Word* document, *Scriptor* will reformat, renumber, and reprint the script. Supports LaserWriter and daisywheel printers. $295. Screenplay Systems, 348 E. Olive Ave., Suite F, Burbank, CA 91502. NCP (May 87)

Spelling Champion is a fast and accurate batch-type spelling ★★★★ checker. Back-up feature allows you to undo corrections in a paragraph. Works only with *MacWrite* 4.5. $39.95. Champion Software, 6617 Gettysburg Dr., Madison, WI 53705. NCP (Oct 86)

Spellswell is an effective and powerful standalone spelling checker. ★★★★★ It has many advanced features such as capitalization and homonym checking and comes with a large, well-chosen dictionary. Very good dictionary, good value. $74.95. Working Software, 321 Alvarado, Monterey, CA 93940. NCP (May 86) ★'86 Eddy

Thunder! is one of the best spelling checkers around. Features ★★★★★ Learned Words (a superb glossary) and statistics. A very fast DA, it works interactively and in selection mode. Requires 512K+. $49.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. NCP (Dec 86) ★'86 Eddy

Word 3.01 fixes many of the bugs of the justly maligned 3.0. Still, ★★★★½ it's the most feature-laden word processor around. Also has Microsoft's somewhat unusual view of what the Mac interface is. Esoteric command key combinations. Requires 512K+. $395. Microsoft, 16011 NE 36th Way, Redmond, WA 98073. NCP (Mar 88)

WorksPlus Spell is a speedy spelling and hyphenation checker for ★★★★½ *Microsoft Works.* It includes a glossary for abbreviations and time/date stamping. The biggest drawback is its limitation to one program. $59.95. Lundeen & Associates. PO Box 30038, Oakland, CA 94604. NCP (Oct 87) ★'87 Eddy

Write is a "beginner's" version of *Word* 3.0. More features ★★★ than some word processors in its class, but not all of the features work well. Poor value, and expensive upgrade path to *Word.* $175. Requires 512K+. Microsoft, 16011 NE 36th Way, Box 97017, Redmond, WA 98073-9717. NCP (May 88)

WriteNow for the Macintosh has many of the features of *MacWrite* ★★★★½ and then some, including the ability to work in columns. Has built-in spelling checker with 50,000-word dictionary. $175. T/Maker, 1973 Landings Dr., Mountain View, CA 94043. NCP (Mar 87)

SYSTEM SOFTWARE

HyperCard is a totally unique program for the Mac. It uses an index ★★★★ card metaphor and it contains a programming language, HyperTalk. Requires 1M+. Free with new Macs, otherwise $49.95. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (Dec 87) ★'87 Eddy

System Tools 5.0 is the Apple System upgrade for Mac Plus, SE, ★★★★ and II owners. It contains *MultiFinder* (a multitasking environment), a LaserWriter spooler, and a Control Panel resource to add color on the Mac II desktop. Takes 1M+. $49. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (Mar 88)

HYPERCARD

Business Class is a *HyperCard* stack that contains world travel ★★★½ information and itinerary planning. Uses maps to locate countries of interest, but it lacks United States domestic travel information. Requires 1M+ and *HyperCard.* $49.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. NCP (Mar 88)

Focal Point is a *HyperCard* stack that ties together a calendar, ★★★★½ phone log, client accounts, and more in one easy-to-use organizational tool. Requires 1M+ and *HyperCard.* $99.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. NCP (Mar 88)

HyperBook Maker adds many of the printing utilities that *Hyper-* ★★★ *Card* lacks. Best used to figure out signature breaks to print pamphlets. Version 1.1a reviewed. Mac II and *MultiFinder* friendly. $59.95. Ideaform, 612 West Kirkwood, Fairfield, IA 52556. NCP (Jun 88)

HyperDA lets you browse through *HyperCard* stacks through a desk ★★★★ accessory. A true equalizer for 512K Mac owners who can-

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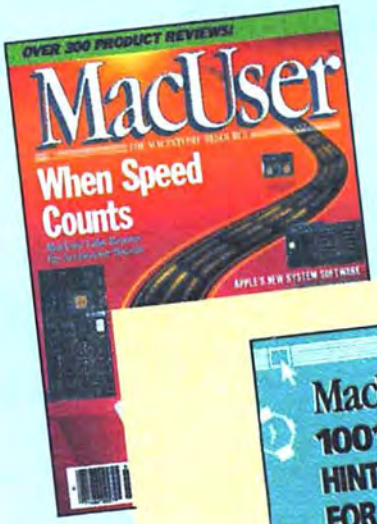
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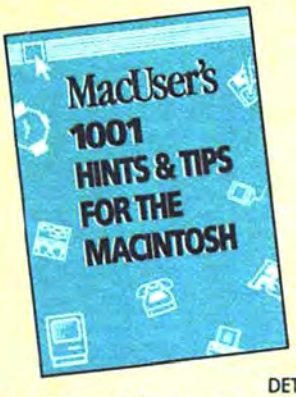
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not normally access stackware. Doesn't support global variables. Requires 512K+. $69. Symmetry, 761 E. University Dr., Mesa, AZ 85203. NCP (May 88)

HyperTutor is a stack that teaches HyperTalk, *Hypercard*'s pro- ♦♦♦♦½ gramming language. Uses an interactive Test Mac on each card to write scripts. A variety of windows makes it good for both beginners and advanced programmers. $49.95. Teligraphics, 936 Sir Francis Drake Blvd., Kentfield, CA 94904. NCP (Apr 88)

ORGANIZATIONAL TOOLS

Acta is an outline processor in desk accessory format. It has practi- ♦♦♦♦½ cally all the power of a standalone program, and then some. Can save files as *Acta* outlines, *MacWrite* or text files. $59.95. Symmetry, 761 E. University Dr., Mesa, AZ 85203. NCP (Jul 86)

AEC Information Manager helps middle-level paper-pushers keep ♦♦½ track of projects from start to finish. Has date calculations, scheduling graphs, and alarms. Overpriced. Version 1.21 reviewed. Requires 1M+. $695. AEC Management Systems, 20524 Amethyst Lane, Germantown, MD 20874. NCP (Jul 88)

Calliope is a new type of outlining program. Chunks of information ♦♦♦ are manipulated as small "light bulbs" containing text. Related elements can be graphically connected, and their text information viewed in hierarchical order. Text files can be created for *MacWrite* editing. $99. Innovision, PO Box 1317, Los Altos, CA 94023. NCP (Sep 86)

Comment (previously known as *Memorandum*) is the electronic ♦♦♦½ equivalent of Post-it Notes. Notes can be attached to many different types of documents. Doesn't work well with *SuperPaint* or *Microsoft Works*. An alarm clock feature alerts users of Timed Notes. $99.95. Deneba Systems, 14206 SW 136th St., Miami, FL 33186. NCP (Nov 87)

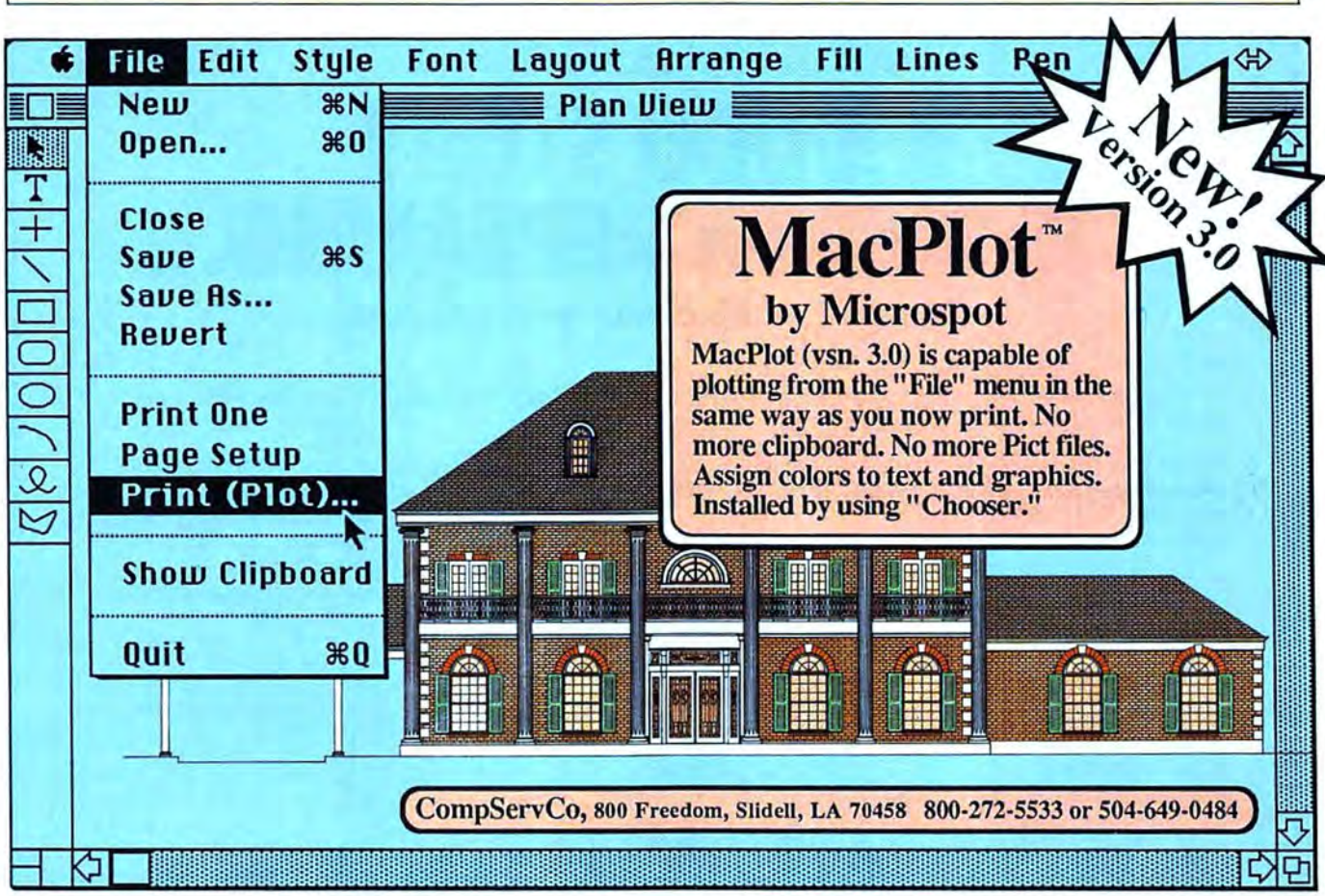
DecisionMap organizes data to facilitate decision making. Unique ♦♦♦ weighting abilities make this a powerful tool. The decision analysis process is long and sometimes complex, but never difficult. $145. SoftStyle, 7192 Kalanianole Hwy., Honolulu, HI 96825. CP

Design is a powerful organizational tool. It goes beyond mere flow- ♦♦♦♦ charting. Complex, detailed program aimed at software pros. $250. Meta Software, 150 CambridgePark Dr., Cambridge, MA 02140. NCP (Apr 87)

FlowMaster charts your ad dollars in print, TV, billboard, and other ♦♦♦♦♦ mediums. Analyzes cost/benefit of a campaign in terms that even jaded Mad. Ave. execs will find innovative. Includes bar-chart and tabular output. Requires 512K+. $495. Select Micro Systems, 40 Triangle Ctr., Yorktown Heights, NY 10598. NCP (Jan 88)

GeoQuery puts your database on the map by accessing Zip code ♦♦♦♦ information. Comes with maps of the U.S. Other atlases available. Version 1.0 reviewed. Requires 1M+ and second disk drive. $349. Odesta, 4084 Commercial Avenue, Northbrook, IL 60062. NCP (Jul 88)

Guide allows you to "cross reference" from within a document ♦♦♦♦½ using hypertext. You can set up words or sections of the document so that double-clicking brings up explanatory ma-



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terial, graphics, and other useful items. The word processing and formatting functions, however, are limited. $135. OWL International, 14218 NE 21st St., Bellevue, WA 98007. NCP (Apr 87)

Instant Expert is an excellent way to learn the mechanics of creating an expert system. The inference engine (that ultimately finds the answer) is visible. Lacks a true Mac interface. Version 1.0. $49.95. Human Intellect Systems, 1670 S. Amphlett Blvd., Suite 326, San Mateo, CA 94402. NCP (Jan 88)

MacProject allows a user to plan and track a project from beginning to end. Uses CPM to produce schedules with start and finish dates for each task. Can report on resource interdependencies and generate all needed printed reports. $195. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (Mar 86)

MacSMARTS can create small standalone expert systems. Features hypertext connections to Paint, PICT, SYLK, and text files. Still a little buggy. Requires 512K+. Version 1.03. $149.95. Cognition Technology, 55 Wheeler St., Cambridge, MA 02138. NCP (Jan 88)

Micro Planner Plus is a great project management system. Outstanding analysis capability. Memory based, making it much faster than the original. Includes a font menu. Even saves reports out in *MacDraw* format for further work. Uses standard print drivers. HFS compatible. $495. Micro Planning International, 235 Montgomery St., San Francisco, CA 94104. NCP (Dec 86)

MORE is an incredibly powerful outline processor with gobs of great features: instant charts, math capabilities, multiple windows, font and style control, templates, and more. Prints outlines in any of several standard formats, even in color. Requires 512K+. $395. Symantec,, 117 Easy St., Mountain View, CA 94043. NCP (Jan 87) ★'86 Eddy

PowerPoint is a comprehensive presentation creation tool. Handles 35mm slide and overhead transparency formats. Good graphics and text editing capabilities. Requires 512K+. $395. Microsoft, 16011 NE 36th Way, Redmond, WA 98073-9717. NCP (Aug 87) ★'87 Eddy

STELLA for Business is a simulation tool used to model complex business systems. Requires that you master a discipline called "system dynamics." Requires 512K+. Mac II version available. $350. High Performance Systems, 13 Dartmouth College Hwy., Lyme. NH 03768. NCP (Jun 88)

SuperExpert is an expert system shell that induces rules from examples. Rules become unwieldy when many criteria and examples are used. Overpriced. Version 1.4 reviewed. Requires 512KE. $199.95. Softsync, 162 Madision Avenue, New York, NY 10016. NCP (Jul 88)

DESK MANAGERS

Executive Office is a jack of all trades office application. Good database, word processing, graphics, and minispreadsheet. Available on 400 or 800K disks; get the 800 if you can. $249.99. DataPak, 14011 Ventura Blvd., Sherman Oaks, CA 91423. CP (Mar 87)

Front Desk lets small businesses and offices easily keep track of personnel schedules, activities, and payments. The pro-

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gram can keep track of up to 15 employees, functioning as a day-, week-, and month-at-a-glance calendar. $149.95. Layered, 529 Main St., Boston, MA 02129. NCP (Dec 85)

MockPackage+ is a set of extremely powerful DAs. Includes a ★★★★½ text editor, text printer (supports LaserWriter), charter, terminal, and EZmenus. HFS compatible. $35. CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Mar 87)

My Office lets you handle your files and papers in much the same ★★★★ way you did before you got a computer. Excellent use of graphic symbols. $129.95. DataPak, 14011 Ventura Blvd., Sherman Oaks, CA 91423. CP (Prem)

Quickset is a set of desk management and organizational tools that ★★★ can be used as desk accessories or applications. Functions include note filer, card filer, calendar, phone dialer, financial, and statistical calculators, and a file encryptor. $49.95. EnterSet, 2380 Ellsworth, Berkeley, CA 94720. NCP (Dec 85)

SideKick 2.0 beefs up original *SideKick* DAs and adds two major ★★★★ new ones — *MacPlan*, (formerly *Click-On Worksheet*) and *Outlook*, a full-featured outliner. Also comes with seven applications to support the desk accessories. $99.95. Borland International, 4585 Scotts Valley Dr., Scotts Valley, CA 95066. NCP (Jun 87)

Smart Alarms is the best reminder system for the Mac. Easy to use, ★★★★½ versatile and, well, smart. This self-running DA automatically reminds you of anything you enter into its Reminder file, giving you a wide range of useful advance warning options. $49.95. Imagine Software, 19 Bolinas Rd., Fairfax, CA 94930. NCP (Oct 86)

Top Desk is a set of 7 self-installing (and self-removing) DAs. *Menu* ★★★★½ *Key* adds Command key sequences to programs; *View* allows looking at and moving data between up to 8 *MacWrite* documents; also included are *BackPrint*, *Touch 'n' Go*, *Blank*, *Encrypt*, and *Launch*. $59.95. Cortland Computer, PO Box 9916, Berkeley, CA 94709. NCP (May 86) ★'86 Eddy

UTILITIES

Accessory Pak 1 is a set of useful applications and utilities. *Paint* ★★★★ *Cutter* alone is worth the price. That program allows users to browse and manipulate full page *MacPaint* documents. $39.95. Silicon Beach, PO Box 261430, San Diego, CA 92126. NCP (Nov 85)

AutoSave DA is insurance against system crashes. It saves your ★★★ work automatically at intervals from 1 to 99 minutes. Compatible with many applications, but not recommended for use with databases. $49.95. Magic Software, 1706 Galvin Rd. S., Bellevue, NE 68005. NCP (Jan 88)

Capture saves any portion of a Macintosh screen to the Clipboard or ★★★★★ as a PICT file. Works in color on the Mac II. Requires 512K+. *MultiFinder* friendly. $59.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP (Jun 88)

Colorizer adds pigments to the desktop and black and white appli- ★★★ cations. Also colors PICT graphics. System resources include saving and printing color screens. A useful novelty that'll run its course as developers add color to apps. Requires Mac II. $49.95. Palomar Software, PO Box 2635, Vista, CA 92083. NCP (Jan 88)

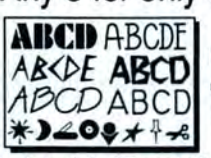
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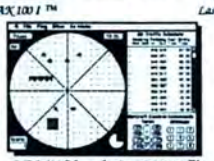
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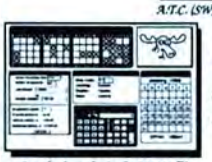


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Copy II Mac does efficient sector and bit copies and in its latest ↕↕↕↕↕ version can back up virtually all Mac software. Features graphic displays of copy progress. Comes with *MacTools*, a multi-use utility that can recover many damaged files. $39.95. Central Point Software, 9700 SW Capitol Highway, Portland, OR 97219. NCP (Apr 86) ★'85 Eddy

DiskExpress unfragments disk volumes by reorganizing data into ↕↕↕↕ continuous sectors and arranging files to slow down further fragmentation. Works with *MacServe*, floppy drives, and most hard drives. Requires 512K+. $39.95. ALSoft, Box 927, Spring, TX 77383. NCP (Feb 87)

DiskFit is a utility for backing up and restoring hard disk files. Cre- ↕↕↕↕½ ates a "SmartSet" of floppy disks so incremental back-ups only update files modified since the last back-up procedure. Backs up to floppies or another hard disk. Requires 512K+. $74.95. SuperMac Software, 295 N. Bernardo Ave., Mountain View, CA 94043. NCP (Jun 87)

DiskQuick is an easy-to-use cataloging program. Criteria selection ↕↕↕↕ option for generating subcatalogs. Requires 512K+. $49.95. Ideaforms, PO Box 1540, Fairfield, IA 52556. NCP (Apr 87)

Disk Ranger is a speedy cataloging program that doubles as an ↕↕↕↕ efficient labelmaker. Comes with pinfeed labels. Works with regular and hard disks. Can catalog HFS systems. $34.95. Graham Software, 8609 Ingalls Circle, Arvada, CO 80003. NCP (Mar 86)

DiskTop is a desk accessory *Finder* replacement of extraordinary ↕↕↕↕½ power and ease of use. Comes with the useful *LaserStatus* DA and *Widgets* application. The extras alone are worth the price. Requires 512K+. Upgrade from version 1.0, $7; $10 with new manual. $49.95. CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Aug 87)

DiskTools Plus is a set of 8 useful DAs and applications. Earlier ↕↕↕↕↕ version was sold as *Battery Pak*. The DA *Disk Tools II* is a *Finder* replacement. Also included are an RPN calculator, *Phone Pad*, and *Calendar Manager*. Requires 512K+. $49.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. NCP (Mar 88)

Dubl-Click Calculator Construction Set lets users design person- ↕↕↕↕½ alized calculators with a variety of standard and special functions. Finished calculators can be saved as installable desk accessories or as clickable applications. $59. Dubl-Click Software, 18201 Gresham St., Northridge, CA 91325. NCP (Apr 86)

Eureka: The Solver is a free-form numerical equation solver. Stand- ↕↕↕ ard trigonometric and logarithmic functions are available as is treatment of imaginary and complex numbers. $195. Borland International, 4585 Scotts Valley Dr., Scotts Valley, CA 95066. NCP (Mar 88)

Fastback for the Macintosh is hard disk back-up software that is ↕↕↕ very quick if not very efficient. Doesn't automatically exclude applications. Creates a separate catalog disk. $99.95. Fifth Generation Systems, 1322 Bell Ave., Tustin, CA 92680. NCP (Apr 88)

Fedit Plus is the file and disk editor for everyone, from newest Mac ↕↕↕↕↕ owner to oldest. It can do more for your disks and files than any other application. Can recover deleted MFS files. If you own a Mac, get it. HFS-compatible. $49.95. MacMaster



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Systems, 108 E. Fremont Ave., #37, Sunnyvale, CA 94087. NCP (Sep 86) ★'86 Eddy

Findswell is an indispensible utility that installs a new button in the ↕↕↕↕↕ Open Dialog box of virtually every Macintosh application. Press the button, type a search string, press Find and *Findswell* searches for any files that match. Click Open or double-click to open the correct file. Requires 512K+. $49.95. Working Software, 321 Alvarado, Monterey, CA 93940. NCP (Nov 87) ★'87 Eddy

1stAid Kit HFS recovers lost or damaged files from floppy or hard ↕↕↕↕½ disks. An excellent manual-turned-textbook actually teaches the Hierarchical File System. Requires 1M+. Version 2.2 reviewed. $99.95. 1st Aid Software, 42 Radnor Rd., Boston, MA 02135. NCP (Jun 88)

Font/DA Juggler Plus gives you unlimited access to almost any ↕↕↕↕ number of fonts, desk accessories, and sounds. Uses hierarchical menus. $59.95. Alsoft, PO Box 927, Spring, TX 77383. NCP (May 88)

Glue adds a print-to-disk capability to many programs. *ImageSaver* ↕↕↕↕½ installs as printer driver; *Viewer* allows copying and printing of *Glue* files. Handy utility for desktop publishers. $59.95. Solutions International, Box 989, Montpelier, VT 05602. NCP (Dec 86)

Hard Disk Util uses patch files to allow users to mount and run ↕↕↕↕½ specified programs on their hard disks. The list of patches is constantly expanding. $89.95. FWB Software, 2040 Polk St., San Francisco, CA 94109. NCP

HFS Backup ranks as one of the preferred hard disk back-up utili- ↕↕↕↕½ ties. Back up by file/folder or last changes. Back-up specifications can be saved as templates. Good graphic interface. Reliable program. $49.95. PCPC, 4710 Eisenhower Blvd., Tampa, FL 33634. NCP (Dec 86)

HFS Locator Plus is *the* essential HFS desk accessory. It can ↕↕↕↕ search for a file by name or date of creation, create folders, move files from one folder to another, set a program to launch while in an application. $39.95. PBI Software, 1163 Triton Dr., Foster City, CA 94404. NCP (Sep 86)

Icon-It! (v. 1.0) lets you create icons to use as an alternative to ↕↕↕↕½ menu commands. Comes with 47 icon templates or you can create your own. $79.95. Olduvai Software, 7520 Red Rd., South Miami, FL 33143. NCP (Feb 88)

LabView is a graphical programming environment that creates "vir- ↕↕↕↕ tual instruments" to perform calculations, acquire laboratory data, and control instrumentation. Slow. Version 1.1 reviewed. $1900. National Instruments, 12109 Technology Boulevard, Austin, TX 78727-6204. NCP (Jul 88)

LaserServe is a printer spooler for AppleTalk networks. After instal- ↕↕↕↕↕ lation all operations done via a desk accessory. Works with both *MacServe* and *TOPS*. Requires 512K+ and 800K drive or hard disk. $95 per node. Infosphere, 4730 SW Macadam Ave., Portland, OR 97201. NCP (Feb 87)

Mac Disk Catalog II is a utility that will quickly organize a moderate ↕↕↕↕ size disk library. Easy to use with powerful reporting and label-making features. $49.95. New Canaan MicroCode, 136 Beech Rd., New Canaan, CT 06840. NCP (Dec 85)

MacEZ-Mill is a CAM program that controls industrial milling ma- ↕↕↕↕½ chines. Quickly writes part programs that previously only very experienced designers could execute. $6000. Bridge-

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port Machines, 500 Lindley Street, Bridgeport, CT 06606. CP (Jul 88)

MacFlow is a design tool created for programmers. Traditional flow-
★★★½ charting symbols are linked together, and a symbol can be connected to a separate flowchart file. Symbols can't be edited, precluding using *MacFlow* for other applications. $125. Mainstay, 5211-B Derry Ave., Agoura Hills, CA 91301. NCP (Apr 87)

MacInUse tracks time spent in applications and saves info as text
★★★★★ files. Installs on any disk, works in background. MFS, HFS compatible. Extremely valuable for tax purposes, client records, etc. $79. SoftView, 4820 Adohr Lane, Camarillo, CA 93010. NCP (Jan 87) ★'86 Eddy

MacLabeler lets users instantly index and print labels for all the
★★★½ disks in a burgeoning collection. Choose border type and orientation of your label; index by folder or document. Starter set of labels is included. $49.95. Ideaform, PO Box 1540, Fairfield, IA 52556. NCP (Prem)

MacNosy is a global disassembler. A very advanced user can
★★★★★ use this program to look into the code of virtually any program. This advanced tool can take you places no other Mac program could dream of going IF you have the skill to guide it. The documentation is sparse. For pros only. $90. Jasik Designs, 343 Trenton Way, Menlo Park, CA 94025. NCP

MacSafe is a data file security program that allows you to place
★★★★ multiple files into a "safe," and then you can further protect them through two types of encryption (including DES). Flexible and very easy to use. Allows for installation on hard disk. $149.95. Kent Marsh Ltd, 1200 Post Oak Blvd., Houston, TX 77056. CP (Mar 87)

MacServe converts a Mac and a hard disk into a disk and print
★★★★½ server. Uses the AppleTalk network and is easily hooked up. Users can partition the hard disk into multiple volumes. Runs in the background, so users can work on all machines in the network. $250. Requires 512+. Infosphere, 4730 SW Macadam, Portland, OR 97201. CP

MacTree displays your files in the form of a hierarchical tree. Good
★★★½ idea, poor performance. Can't view tree easily. Good search function. Requires 512K+. $69.95. Software Research Technology, 22901 Mill Creek Dr., Laguna Hills, CA 92653. NCP (Apr 88)

MacZap is a three-part disk and memory utility. It can be used to
★★★★ recover some damaged files and disks, compare disks, analyze disk structure, and make back-up copies of most disks. $60. Micro Analyst, 2505 Roxmoor, Austin, TX 78723. NCP (Jan 86)

Menu Fonts displays the names of fonts in the actual font instead of
★★★ standard Chicago. Won't work with programs that have a nonstandard Font menu or no Font menu. Comes with *Lock-Out*, a utility that gives password access to your Mac, and *FastFormatter*, a utility for formatting multiple blank disks. Requires 512K+. $15. Beyond Software, 6069 E. Grant Rd., Tucson, AZ 85712. NCP (Jul 87)

myDiskLabeler is an excellent label maker. It can read directories
★★★★ and use large or small icons or anything desired. Comes with 54 precut labels. $44.95; with color printing ability (on the ImageWriter II), $54.95; with PostScript font capability (on

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the LaserWriter), $64.95. Williams and Macias, PO Box 19206, Spokane, WA 99219. NCP (Aug 87)

'Ncryptor is a simple safe program that lets users password ★★★★ their files. The same program is used for encoding and decoding. This is one of the best products in its category. $39.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP

Packit III is an essential utility. Primarily used to temporarily "glue" ★★★★½ files together, it can also compress and encrypt. Feeware. $10, $10 for printed manual. Harry R. Chesley, 1850 Union St., San Francisco, CA 94123. NCP (Jan 87)

PowerStation is an extremely easy-to-use, versatile and powerful ★★★★★ *Finder* substitute. Loaded with power user features. Comes with *Pyro!* $59.95. Fifth Generation, 1322 Bell Avenue, Tustin, CA 92680. NCP (Dec 87)

Printworks for the Mac is a comprehensive software-based dot-★★★★ matrix printer control system. Optimizes printing from different applications, and is easy to use. Requires 512K+. $75. SoftStyle, 7192 Kalanianaole Hwy., Honolulu, HI 96825. NCP (Aug 87)

Programmer's On-line Companion puts an abridged version of ★★★ *Inside Macintosh* in your system for reference. Simply read the text or transfer some or all of it directly into your normal editing window. Non-Macish interface makes the program confusing, somewhat difficult to use. $34.95. Addison-Wesley, Route 128, Reading, MA 01867. NCP (Jul 87)

Quick & Dirty Utilities, Volume One is a disk full of handy pro-★★★★½ grams. Several desk accessories include a menu bar clock and a terminal emulator. $39.95. Dreams of the Phoenix, PO Box 10273, Jacksonville, FL 32247. NCP (Nov 85) ★'85 Eddy

QuicKeys lets you make full use of your keyboard. Assign any ★★★★ command (menu choices, DAs, etc.) or series of text blocks and/or command to any key or key combination. Enormously powerful; necessary for Apple Extended Keyboard owners. Requires 512K+. $99.95. CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Jan 88) ★'87 Eddy

RamSnap is a RAMdisk and disk cache in one easy-to-use pack-★★★★ age. Can store multiple configurations as files. Good product but a little pricey. $59.95. Dove Computer Corp., 1200 North 23rd St., Wilmington, NC 28405. NCP (Jun 87)

Read-it! (v. 1.0) is the best consumer value in optical character ★★★★ recognition software. Works with any scanner that saves images as a bit map, PICT or TIFF file. Comes with type tables that can be customized. Version 1.1, $395; ThunderScan version, $149.95. Olduvai Software, 7520 Red Rd., South Miami, FL 33143. NCP (Apr 88)

Sentinel encrypts data files (or sets of files) using a super-secure ★★★★ DES or a super-fast SuperCrypt algorithm. Provides high-level security if you can keep your passwords secret. Requires 1M+. $149.95. SuperMac, 295 N. Bernardo Ave., Mountain View, CA 94043. NCP (Apr 88)

SmartScrap and The Clipper are two useful desk accessory utili-★★★★½ ties for graphics work. *SmartScrap* is a major enhancement to the standard Scrapbook DA. *The Clipper* provides you with a transparent Clipboard window, allowing you to resize or crop a graphic to the area that it will be pasted to. $59.95.

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Solutions International, PO Box 989, Montpelier, VT 05602. NCP (Jul 87) ★'87 Eddy

SoundWave is a useful sound recording and editing utility. Works ¢¢¢¢ with waveforms; able to change sampling rates. Previously known as *SoundCap*. $199.95. Impulse, 6870 Shingle Creek Parkway, Minneapolis, MN 55430. NCP (Apr 88)

Stepping Out is a software virtual screen extender. Lets you create ¢¢¢¢¢ a screen as large as memory allows. 9-inch screen is a "view" to larger screen. Also has reduction features. Amazing. $95. Berkeley System Design, 1708 Shattuck Ave., Berkeley, CA 94709. NCP (Mar 88)

Suitcase is a transparent program that automatically lets you use ¢¢¢¢¢ all your fonts and DAs. Foolproof and indispensible. Comes with *Pyro!*, the best screen saver. Requires 512K+. $59.95. Fifth Generation, 1322 Bell Avenue, Tustin, CA 92680. NCP (Nov 87) ★'87 Eddy

SuperLaserSpool is a LaserWriter spooler. Very fast because it ¢¢¢¢ does conversion to PostScript in the background, but doesn't print a faithful rendition of *PageMaker* documents as a result. $149.95 single user, $395.95 for up to five users on one network. SuperMac Software, 950 N. Rengstorff Ave., Mountain View, CA 94043. NCP (Jun 87)

Switcher is Andy Hertzfeld's contribution to Mac productivity. This ¢¢¢¢¢ program lets users run several programs at once (up to 8 on a 1-megabyte or larger machine). Switching between the programs is nearly instantaneous. Requires 512K+. $19.95 from Apple, free from BBSs, included with some third-party applications. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (Jun 86)

Tempo is a desk accessory that allows most Mac commands to be ¢¢¢¢ intelligently recorded and played back. Capabilities include pausing, conditional branching, and macros that work between applications. $99. Affinity Micro Systems, 1050 Walnut St., Boulder, CO 80302. NCP (Jul 86)

TMON is *the* debugger for the Mac. This isn't open to question. ¢¢¢¢¢ *TMON* is simply the best. Comes with the latest version of Darin Adler's Extended User Area. $149. ICOM Simulations, 626 Wheeling Rd., Wheeling, IL 60090. NCP

Turbo Download is a desk accessory designed specifically to in- ¢¢¢¢½ crease the speed of Xmodem data transfers from national databases to your Mac. Speed increases range upward from 50% to over 300% at 2400 baud. $39.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP

Twelve-C Financial Desk Accessory brings all the power and ¢¢¢¢ functionality of a Hewlett-Packard 12C programmable calculator to your desktop. Can be programmed and all registers can be viewed while calculator is running. $39.95. Dreams of the Phoenix, PO Box 10273, Jacksonville, FL 32247. NCP

TypeNow is a desk accessory that allows the Mac and ImageWriter ¢¢¢¢ to function as an electronic typewriter. Type can be placed into blanks in complex forms easily. Typing can be recorded and played back. $39.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP (Jan 86)

WorksPlus Command lets you build and define macros for all ¢¢¢¢ *Works* modules. Predefined macros provide for an even tighter integration of program's word-processing, spreadsheet, and database modules. Requires 1M+. $99.95.

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MINIFINDERS



Lundeen & Associates, PO Box 30038, Oakland, CA 940604. NCP (May 88)

LANGUAGES

AAIS Prolog is a fast standard Prolog with excellent debugging and error handling. Good for serious program development. Documentation is not as good as the program. $150. Advanced AI Systems, PO Box 39-0360, Mountain View, CA 94039-0360. NCP (Mar 87)

Aztec C is a C language that will appeal to users with a UNIX background. It uses many UNIX conventions and in the more expensive versions comes with standard UNIX utilities, including the VI editor. $75 beginners, $199 basic system, $299 development system, $499 commercial system. Manx Software Systems, PO Box 55, Shrewsbury, NJ 07701. NCP (May 86)

Basic Compiler is the long awaited compiler for *Microsoft BASIC*. The interface is unfriendly, but it gets the job done. Compiled programs run faster, but you can still tell they are written in BASIC. $195. Microsoft, 16011 NE 36th Way, Redmond, WA 98073-9717. NCP (May 87)

ExperCommon Lisp is a LISP development system. Not fully Common LISP compatible, but creates good compiled code and standalone applications. Requires 1M+. $995. ExperTelligence, 559 San Ysidro Rd., Santa Barbara, CA 93108. NCP (Aug 87)

ExperLISP is a useful programming language for high-level programmers. The more you use it, the more you'll figure out about it. $495. Requires 512K+. ExperTelligence, 559 San Ysidro Rd., Santa Barbara, CA 93108. CP

ExperLogo is a version of the popular teaching language, Logo. Features three-dimensional graphics using "bunnies" rather than usual "turtles." Very speedy, smooth program. Comes with an excellent manual. $149.95. ExperTelligence, 559 San Ysidro Rd., Santa Barbara, CA 93108. CP

ExperProlog II is a Prolog based on the new Prolog II standard. Has the ability to handle infinite trees and allows user-defined functions that operate conditionally. Documentation is not the best and Mac interface is nonstandard. $495. ExperTelligence, 559 San Ysidro Blvd., Santa Barbara, CA 93108. NCP (Mar 87)

Lightspeed C provides an integrated environment for developing desk accessories, applications, and code resources in C. The editor works with the compiler for searches and file management. Can get awkward if you need something outside the environment. $175. Think Technologies, 135 South Rd., Bedford, MA 01730. NCP (Apr 87)

Lightspeed Pascal is a fast, powerful development system for Pascal programming. Fully integrated Mac-like environment. Requires 512K+. $125. Think Technologies, 135 South Rd., Bedford, MA 01730. NCP (Feb 87)

LPA MacProlog (v. 2.0) is a much improved program that includes incremental and optimizing compilers, a graphics environment package, and C and Pascal submodules. Requires 1M+. $495. Programming Logic Systems, 31 Crescent Dr., Milford, CT 06460. NCP (Feb 88)

MacAsm is a software development system that allows programs to be written in assembly language. Programmers can assemble, edit, and test software, and an integrated resource compiler lets independent applications run from their own icons. $125. Mainstay, 5311-B Derry Rd., Agoura Hills, CA 91301. NCP

Mac C is a good, highly Mac-oriented implementation of this popular development language. Assembler and linker included. $425. Consulair, 140 Campo Dr., Portola Valley, CA 94025. NCP ★'85 Eddy

MacExpress is a development environment or shell. Programmers use it to save time and effort when developing standalone applications for the Mac. $195. ALSoft, PO Box 927, Spring, TX 77383. NCP (Feb 86)

MacForth Plus is an excellent implementation of the popular Forth programming language. New, reduced price, $199. Creative Solutions, 4701 Randolph Rd., Rockville, MD 20852. NCP

Mach II is a multitasking implementation of Forth that allows local variables and text files. Can create standalone applications. Several windows can be up with different operations in each, operating concurrently. Execution is fast. $99.95. Requires 512K+. Palo Alto Shipping, PO Box 7430, Menlo Park, CA 94026. NCP (Apr 86)

Macintosh 68000 Development System is a fairly traditional assembly language package. The two-disk set provides an editor (*Edit*), an assembler, a linker, an executive, and a resource compiler. $195. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP

Macintosh Pascal is Apple Computer's version of this very popular programming language. Loaded as it is with innovative teaching features, this interpreter is an excellent introduction to Pascal. $125. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. CP

MacScheme is a LISP dialect with "artificial intelligence" capabilities. Has a large appetite for RAM. Interpreted language with Toolbox access limited to a small part of QuickDraw. $125. Semantic Microsystems, 4470 S.W. Hall St., Beaverton, OR 97005. NCP (Jun 86)

MacScheme+Toolsmith is a Mac version of Scheme, a LISP dialect. Beautiful implementation, marred only by relative slowness compared to similar products. Get *Toolsmith*. Requires 1M+. $395. Semantic Microsystems, 4470 S. W. Hall, Beaverton, OR 97005. NCP (Aug 87)

Megamax C is an easy to use, full version of C. Has a compiler, linker, disassembler, editor, and much more. Good for beginners. Excellent documentation. $299.95. Megamax, PO Box 851521, Richardson, TX 75085. NCP

Microsoft BASIC was the Mac's first programming language. This interpreter (it's not a compiler) now supports the Toolbox and the whole Mac interface can be implemented in your programs. For nonprogrammers there are lots of programs available. $99. Microsoft, 16011 NE 36th Way, Redmond, WA 98073-9717. NCP ★'85 Eddy

MIDIBasic is a library of simple, but highly useful routines for writing MIDI software. Good stuff. Sketchy documentation. Works with both *Microsoft* and *ZBasic*. Requires 512K+ plus BASIC. $49.95. Altech Systems, 831 Kings Highway, Shreveport, LA 71119. NCP (Aug 87)

Object Logo is an object-oriented programming language with access to the Toolbox. Good product, but can't produce standalone applications. Requires 512K+. $79.95. Coral Software, PO Box 307, Cambridge, MA 02142. NCP (Aug 87)

Personal Prolog is an inexpensive and well-documented program. Has no debugging or search and replace facilities, making it a more appropriate tool for learning than development. Documentation and use of Mac interface are excellent. $64.95. Optimized Systems Software, 1221 B Kentwood Ave., San Jose, CA 95129. NCP (Mar 87)

Prolog/m is a solid Prolog following the Edinburgh standard. Has extensive debugging facilities, but you'll need separate *Toolbox* disk with 58 additional predicates. Drawback: no true editing or printing facilities. $99.95. Chalcedony Software, 5580 La Jolla Blvd., La Jolla, CA 92037. NCP (Mar 87)

QUED (Quality Editor for Developers) is the ultimate source code editor. Loaded with useful and well thought out features, it will make any programmer's life much easier. It is not a word processor, however. $65. Paragon Concepts, 4954 Sun Valley Rd., Del Mar, CA 92014. NCP (Mar 86)

TML Data Base Toolkit is an ISAM type database that provides fast and efficient administration of large data files in applications

MINIFINDERS



developed with *TML* compiler. Supports multiple open index files. $89.95. TML Systems, 4241 Bay Meadows Rd., Jacksonville, FL 32217. NCP (Dec 86)

TML (MacLanguage Series) Pascal is a good Pascal compiler, ★★★★★ capable of producing standalone programs. Can use most existing Lisa Pascal programs with only slight modification. Requires 512K+. $99.95. TML Systems, 4241 Bay Meadows Rd., Jacksonville, FL 32217. NCP (Jun 86) ★'86 Eddy

TML Source Code Library shows how to write programs that use ★★★★½ custom definition routines, speech, serial drivers, split bars, and other topics. Provided on three 400K diskettes. Requires *TML Pascal*. $79.95. TML Systems, 4241 Bay Meadows Rd., Jacksonville, FL 32217. NCP (Dec 86)

Visual Interactive Programming is a unique visual programming ★★★★ system for creating simple Macintosh applications. Programs are constructed in a flowchart-type manner. Easy access to most toolbox routines. Poor printing control. $124.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP (Jun 87)

ZBasic is a fast, interactive compiler capable of creating standalone ★★★★ applications that take advantage of Mac's unique features and abilities. Includes *Edit, RMaker* and *MacInTalk*. Requires 512K+. $89.95. Zedcor, 4500 E. Speedway Blvd., Tucson, AZ 85712. NCP (Dec 86)

EDUCATION

Alphabet Blocks teaches prereaders the letters and sounds of the ★★★★★ alphabet. The digitized voice of an on-screen elf is clear and pleasant. Very intuitive. Requires 1M+. $49.95. Bright Star Technology, 14450 N.E. 29th Place, Bellevue, WA 98007. NCP (May 88)

American Discovery is an interactive United States geography ★★★ game that teaches states; capitals; and, in a roundabout manner, postal codes. Suffers from small maps. Requires 512K+. Great Wave Software, 5353 Scotts Valley Dr., Scotts Valley, CA 95066. NCP (May 88)

Business Simulator is a training tool in a simulation game. Make ★★★★ decisions that manage the company through several stages over 25 years. Decisions become more difficult over time. Requires 1M+, 2 disk drives (one must be 800K). May be run from a hard disk. $69.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. NCP (Dec 87)

ChipWits is a combination game and teaching tool. Players create ★★★½ programs to maneuver robots through a set of 8 mazes. The programs are written in *ChipWit*'s built-in icon-based programming language (IBOL). $49.95. BrainPower, 24009 Ventura Blvd., Calabasas, CA 91302. NCP ★'85 Eddy

Course Builder (version 2.0) creates standalone educational appli- ★★★★ cations. An easy-to-learn dedicated programming language uses blocks and arrows. Graphics, animation and sound can be integrated. Version 2 allows mathematical calculations. Poor documentation. $395, plus $10 shipping. TeleRobotics International, 8410 Oak Ridge Highway, Knoxville, TN 37931. NCP (Oct 87)

KidsTime is a package of five quality educational programs for ★★★★ children between the ages of 3 and 12. The programs all have adjustable difficulty levels. Some use speech and one is a nice introduction to musical notes. Sparse documentation. $49.95. Great Wave, 5353 Scotts Valley Dr., Scotts Valley, CA 95066. NCP (Oct 86) ★'86 Eddy

LearnWord 3.0 is a three-part series of cassette tape/diskette ★★★½ modules that explain the intricacies of *Word* 3.0. They do the job, but remind you why cutting classes was more fun. $49.95 per module. Personal Training Systems, PO Box 54240, San Jose, CA 95154. (Apr 88)

LXR•Test generates tests from a database of questions. Makes it ★★★★ easy to modify and scramble test questions. Flexible output. Requires Mac 512E+, two 800K drives, or a hard-disk drive. $199 or $399, depending on features. Logic eXtension Resources, 9651 Business Center Dr., Rancho Cucamonga, CA 91730. NCP (May 88)

MacEdge and **MacEdge II** each contain 8 reading or math drill ★★★ programs for basic skills. Programs follow one of three formats, a bit contrived. Contrivances are design flaws. $49.95 each. Think Educational Software, 16 Market St., Potsdam, NY 13676. CP

MacType offers structured typing instruction. Can teach both ★★★★ standard and Dvorak keyboards. Features include certificates for reaching certain levels. Can be used in a multistudent environment. $49.95. Palantir Software, 12777 Jones Rd., Houston, TX 77070. CP

MasterType is proof that learning to type can be fun. In this arcade- ★★★ style action game words descend from four corners towards the center ship; the user must type them correctly. Features 18 skill levels, tracks errors, recommends lessons and provides comparison scores. $49.95. Mindscape, 3444 Dundee Rd., Northbrook, IL 60062. CP

Practica Musica uses an interactive game and practice approach ★★★★ to teach music theory and ear training. Excellent training tool for the serious music student, it is also fun for anyone who wants to develop a trained ear for intervals, chords, and melodies. Requires 512K+. $125. ARS Nova Software, P.O. Box 40629, Santa Barbara, CA 93140. NCP (Nov 87) ★'87 Eddy

Reader Rabbit teaches 4-to-8-year olds how to read in four elegant ★★★★★ games that play and build off of each other. Requires 512KE+ and an 800K drive. Mac II and *MultiFinder* hostile. Version 2.0 reviewed. $59.95. The Learning Company, 6493 Kaiser Dr., Fremont, CA 94555. CP (Jun 88)

Sensei Physics is a capable, intelligent, well-designed study aid. ★★★★½ Covers Vectors to Thermodynamics to The Nature of Light. Animated experiments let you try out concepts. Requires 512K+. $99.95. Broderbund Software, 17 Paul Dr., San Rafael, CA 94903. CP (Jan 88)

Subli-Mac is a self-hypnosis program, combining subliminal, relax- ★★½ ation, and positive-self-image techniques. Flashes a brief user-written message (against a diversionary pattern) at your subconscious. Dangerous near hard disks. Manual suffers from terminal California-ese. $39.95. Psy-Den, PO Box 248, Champlain, NY 12919. NCP (Jan 88)

ENTERTAINMENT

A Mind Forever Voyaging is a departure in text adventure games. It ★★★ has a more extensive vocabulary and a more involved story than most of the genre. The story here is gripping, but there are only a few puzzles to solve. Requires 512K+. $39.95. Infocom, 125 CambridgePark Dr., Cambridge, MA 02140. NCP (Apr 86)

Alter Ego simulates the entire lifetime of a fictional character. The ★★★★ player's reaction to each multiple-choice event shapes the character's future relationships, job, health, etc. Spectacular the first time you play; after that there are too many similarities to previous characters. $59.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. CP (Jun 86)

The Ancient Art of War gives users a chance to refight some ★★★★½ famous campaigns on both strategic and tactical levels. Campaigns can also be designed from scratch. Very playable, addicting game. Requires 512K+ Mac. $44.95. Broderbund, 17 Paul Dr., San Rafael, CA 94903. CP (Apr 86)

Apache Strike would have been an excellent arcade game in the ★★ late '70s. Now, it's passe. Navigate a helicopter to destroy ever-increasing numbers of enemy aircraft and tanks. Mac II hostile. Requires 512K+. $49.95. Silicon Beach Software, P.O. Box 261430, San Diego, CA 92126. NCP (Jul 88)

MINIFINDERS



Archon pits the forces of Light against Dark in a quest to gain control ♦♦♦♦½ of five Power Points on a checkerboard grid. The shifting cycles of squares' colors keep the balance of power ever-changing. One or two players. $39.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. CP (Oct 86)

Balance of Power is the world's first computer peacegame. This ♦♦♦♦♦ simulation allows players to become either the President of the United States or General Secretary of the Soviet Union. Extraordinary artificial intelligence routines and general play make this a classic. $49.95. Mindscape, 3444 Dundee Rd., Northbrook, IL 60022. CP (Prem)

Battle Stations is a deceptively simple game based on the pen and ♦♦♦♦ paper game of *Battleship*. Requires strategy on several levels. Makes excellent use of Mac sound and graphics. Fun, casual game, especially when the Mac is one of the players. Requires 512K+. $30. Timeline, PO Box 60, Ypsilanti, MI 48197. NCP (Jun 87)

Beyond Zork is yet another installment in the famous *Zork* series of ♦♦♦♦½ text adventures. Find the fabled Coconut of Quendor to restore failing magic in this expert-level game. On-Screen mapping and the Mac's window environment are taken advantage of. $49.95. Infocom, 125 CambridgePark Dr., Cambridge, MA 02140. NCP (Apr 88)

Borrowed Time casts players as detectives who have to solve their ♦♦♦♦ own murder — before it happens. This game requires players to think and act like a detective to solve the game. Good sentence parser, sketchy Mac interface. $44.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. CP (May 86)

Bridge 4.0 provides three other players and the cards for a game of ♦½ rubber bridge. It's an average (Goren) bidder and a less than good card player. Good if it's the only game in town. Plays slowly since it's written in BASIC. $29.95. Artworx Software, 150 N. Main St., Fairport, NY 14450. CP (Sep 86)

Bureaucracy is a paranoiac text adventure that dares you to move ♦♦♦½ to a new house and job and still maintain some degree of sanity, not to mention a low blood pressure. Written by Douglas Adams of *Hitchhiker's* fame. $39.95. Infocom, 125 CambridgePark Dr., Cambridge, MA 02140. NCP (Aug 87)

The Chessmaster 2000 is a masterful chess program that will ♦♦♦♦♦ appeal to both novice and master. You can view the board from 2- or 3-D perspective and turn the board for a better look. Play is smooth and easy, and the program responds by voice. You may get tired of hearing "Gotcha," though. $39.95. The Software Toolworks, 13557 Ventura Blvd., Sherman Oaks, CA 91423. CP (Jul 87)

Crystal Quest combines all the good elements of nearly every video ♦♦♦♦½ game ever made. Move a piece around to gobble up points and crystals. Shoot the nasties and get through the goal before they get you. Excellent sound effects. In color on the Mac II. Requires 512K+. Greene, 15 Via Chualar, Monterey, CA 93940. CP (Apr 88)

Dark Castle is an outstanding achievement in action games which ♦♦♦♦♦ integrates RealSound with superb animation and graphics. You'll need better-than-average hand/eye coordination, but it's well worth the effort. Requires 512K+. $39.95. Silicon Beach, PO Box 261430, San Diego, CA 92126. NCP (Apr 87) ★'87 Eddy

Deja Vu: A Nightmare Comes True is a graphic adventure ♦♦♦♦♦ that breaks new ground. Innovative use of the Mac interface in truly playable and exciting game. A great introduction to graphic adventure games. $49.95. Mindscape, 3444 Dundee Rd., Northbrook, IL 60062. CP (Jan 86) ★'85 Eddy

Dinner at Eight is a useful recipe filing system that includes a ♦♦♦♦ collection of recipes from a nationwide sampling of restaurants. Users enter number of diners and program scales recipes. $49.95. Rubicon, 2111 Dickson Dr., Austin, TX 78704. NCP (Jan 86)

Down Hill Racer is an action game with three skier personalities, ♦♦♦♦ four courses and four skill levels. There's something here for every player, no matter how bad or good. Full digitized sound (very nice!) $49.95. Miles Computing, 7741 Alabama Ave., Canoga Park, CA 91304. CP (Sep 87)

Enchanted Scepters is a surround sound graphic adventure game. ♦♦♦♦ It has a limited vocabulary and virtually no story. Offers extensive and varied scenes and utilizes the Mac interface to the fullest. $39.95. Silicon Beach, PO Box 261430, San Diego, CA 92126. CP (May 86)

Falcon simulates an F-16 fighter jet with gut-tightening, sweat-♦♦♦♦½ making realism. Go against MiGs and dodge SAMs scenarios. Requires 1M+. $49.95. Spectrum HoloByte, 2061 Challenger Dr., Alameda, CA 94501. NCP (May 88)

Ferrari Grand Prix is an exciting race car simulation game. Master-♦♦♦♦ ing it takes quite a bit of time and effort. Startup course and four other courses are built into the program. You can also design your own courses and backgrounds. Requires 512K+. $59.95. Bullseye Software, PO Drawer 7900, Incline Village, NV 89450. CP (Jul 87)

Flight Simulator puts you at the controls of a small plane (prop or ♦♦♦♦ jet) and lets you roam North America. As difficult as real flying. Mac version has features not found on earlier versions, including spotter aircraft. Not all features available on 128K. $49.95. Microsoft, 16011 NE 36th Way, Redmond, WA 98073-9717. CP (Nov 86)

Fokker Triplane is about as near to flying as you can get seated in ♦♦♦♦ front of a computer. Very realistic simulation and excellent graphics. Well-designed and implemented. $59.95. Bullseye Software, PO Drawer 7900, Incline Village, NV 89450. CP (Feb 86)

Fool's Errand is an outstanding collection of 80 puzzles woven around ♦♦♦♦♦ a mythical theme of an evil priestess and the search for wisdom. Requires 512K+. $49.95. Miles Computing, 7741 Alabama Avenue, Canoga Park, CA 91304.MCP (Jul 88)

Gato puts players in command of an American submarine in World ♦♦♦♦½ War II. This superb simulation game uses all of the Mac's graphic capabilities to really make you feel that "you are there." $49.95. Spectrum HoloByte, 2061 Challenger Dr., Alameda, CA 94501. CP (Nov 85)

GO is the Chinese equivalent of chess. Players *plonk* markers on a ♦♦♦½ grid to gain territory and outwit an opponent or the computer. Requires 512K+. Mac II hostile; *MultiFinder* friendly. Version 1.0 reviewed. $49.95. Infinity Software, 1144 65th St., Studio C, Emeryville, CA 94608. NCP (Jun 88)

Grand Slam is an absorbing and realistic tennis simulation game. ♦♦♦♦ Practice or play tournament against Mac-controlled players with different styles and abilities on four different surfaces. 512K or Mac Plus. $49.95. Infinity Software, 1331 61st St., Emeryville, CA 94608. CP (Nov 86)

Handwriting Analyst produces a personality profile based on an-♦♦♦♦½ swers to questions about one's handwriting. It's simple and the results will amaze and astound. $49.95. Ciasa, 2017 Cedar St., Berkeley, CA 94709. NCP (Apr 88)

HardBall is a baseball simulation game complete with umpire's ♦♦♦♦ calls and crowd sounds. Great graphics and a lot of fun for fans. $44.95. Accolade, 5500 S. Winchester Boulevard, San Jose, CA 95128. CP (Feb 87)

Hollywood Hijinx substitutes a modern Hollywood estate for the ♦♦♦♦ famous Underground Empire, but otherwise represents a return to *Zork* gameplay and feel. There's even a maze to navigate. Simplistic, but good. $39.95. Infocom, 15 CambridgePark Dr., Cambridge, MA 02140. NCP (Jun 87)

Klondike 3.3 is a version of solitaire that uses video game-like ♦♦♦♦♦ scoring to create a superb, totally addictive game. Simple to play, nearly impossible to stop playing. Shareware: $10. Unison Software, 415 Clyde Ave., Mountain View, CA 94043. NCP (Dec 87)

MINIFINDERS 

Leather Goddesses of Phobos is another in the long line of witty and entertaining Infocom text adventures. This one lets you choose your sex and comes with a 3D comic and a scratch 'n sniff card. It has three levels of play: tame, suggestive and lewd. $39.95. Infocom, 125 CambridgePark Dr., Cambridge, MA 02140. NCP (Feb 87)

Lode Runner is a 150-screen action-strategy challenge. Move around a grid of ladders and platforms collecting treasure; dig a hole to trap pursuers. Build your own challenges. $39.95. Broderbund, 17 Paul Dr., San Rafael, CA 94903. CP

MacCourses adds four very challenging new courses to *MacGolf*. Courses are swapped on the original *MacGolf* master disk two at a time. Nice add-on for a good game. Requires *MacGolf*. $34.95. Practical Computer Applications, 1305 Jefferson Hwy., Champlin, MN 55316. CP (Apr 87)

MacGolf is a dynamic simulation of real golf. Players have a choice of courses and difficulty levels. Superb playability makes this a must for all golfers and gamers. Requires 512K+. $59.95. Practical Computer Applications, 1305 Jefferson Hwy., Champlin, MN 55316. CP (May 86)

MacMan is a two-part package. The software portion is a decent *PacMan*-like game. The hardware part is a tiny converter that lets you use a joystick with a Mac or Mac Plus. $39.95. Nuvo Systems, 225 Tank Farm Rd., San Luis Obispo, CA 93401. CP (Aug 87)

Mac Pro Football is a terrific sports simulation that gives you the chance to pit any combination of 38 Super Bowl teams against each other and direct team play. It comes with excellent, detailed (and necessary) documentation. Play selection can get a bit Byzantine. $49.95. Avalon Hill, 4517 Harford Rd., Baltimore, MD 21214. CP (Mar 87)

MacRacquetball uses digitized videos and sounds of professional players for a realistic simulation. Has lots of control settings and can be played against someone else over a modem or between hard-wired Macs. Turn off hard disks before playing. $59.95. Practical Computer Applications, 1305 Jefferson Hwy., Champlin, MN 55316. CP (Oct 87)

Maze Survival challenges players to destroy maze walls before roving bugs squash themselves against it. Bugs lay eggs to spawn a new generation. Repetitive. $34.95. Olduvai Software, 7520A Red Road, South Miami, FL 33143. NCP (Aug 87)

MazeWars+ is an interactive, multiplayer game to be played on AppleTalk or through a modem link. Chase opponents through a four-level maze. Requires 512K+, AppleTalk or Hayes compatible modem. $49.95. MacroMind, 1029 W. Wolfam, Chicago, IL 60657. NCP (Nov 86)

MicEdGames is a collection of five educational games, MicAlphabetize, MicTime, MicStates, MicMatch and MicSpell, supposedly for ages 5 to adult. Games are sometimes cute but generally poorly designed. Manual is poorly written. Some entertainment value. $19.95. MicEdWare, 4265 Midland Rd., Saginaw, MI 48603. NCP (Dec 87)

Mind Over Mac features five games. Entertainment for the whole family. Good graphics paired with synthesized sound and on-screen help. $49.95. Think Educational Software, 16 Market St., Potsdam, NY 13676. CP (Feb 86)

MoonMist is an introductory level text adventure game. This is a typical haunted English castle story, not quite up to Infocom's best. It has four versions, so it's good for more then one play. $39.95. Infocom, 125 Cambridge Park Dr., Cambridge, MA 02140. NCP (May 87)

MSFL: Pro League Football is a professional football league simulation that encourages people to play people, not the machine. Fast with lots of stats. Quirky MS-BASIC behavior. Spotty manual. No LaserWriter support. Requires 1M+. $49. MicroSports, PO Box 15799, Chattanooga, TN 37415. NCP (Apr 88)

NewGammon is animated backgammon that will challenge even good players. Features include variable skill levels and strategies and options to play the Mac or watch the Mac play itself. An arcade-like high speed mode is included. $39.95. Newsoft, PO Box 3046, Newport Beach, CA 92663. CP

NFL Challenge simulates coaching and watching professional football. Comes on two disks, one with program and *System*, the other statistical data. Play against either human or computer coaching. Plays are selected from pre-defined playbooks. $99.95. XOR Corp., 5421 Opportunity Ct., Minnetonka, MN 55343. NCP (Jun 87)

Ogre is a strategy tank game played on a hexagon grid. The ogre is an intelligent cybertank out to smash your command post. Customize your defense. Exceptionally good Mac interface. Has two-player option. $30. Origin Systems, 136 Harvey Rd., Building B, Londonderry, NH 03053. CP (Nov 87)

Orbiter puts a real space shuttle on the Mac screen. A multitude of controls, intelligent on-board computer with speech capabilities, real-time graphics, and 16 distinct missions help this program succeed as both a game and a simulation. $49.95. Spectrum HoloByte, 2061 Challenger Dr., Alameda, CA 94501. NCP (Jul 86)

Orbquest is a fantasy role-playing adventure with better-than-average puzzles and an excellent sense of humor. Not as sophisticated as some, but a good value. $49.95. QWare, PO Box 850415, Richardson, TX 75085. CP (Dec 86)

Patton vs. Rommel is a traditional-style strategic war game. It covers events in Normandy in 1944. While complex, it's well-designed and very playable. $39.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. CP (Apr 87)

The Pawn is an unusual British interactive adventure game with text and graphics. The unique interface has some drawbacks, but *The Pawn* has humor, social satire, is entertaining, and is challenging. $44.95. Requires 1M+. Firebird, PO Box 49, Ramsey, NJ 07446. CP (Mar 87)

Pinball Construction Set lets users create their own pinball games, as elaborate or as easy as desired. Uses *MacPaint* for backgrounds and has lifelike sounds (on 512K+ Macs). $39.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. CP (Jan 86)

Plundered Hearts brings gothic romance to interactive fiction in the familiar Infocom mode of puzzles, mazes, and riddles. You play a 17th century heroine dodging pirates to rescue her wrongly imprisoned father. Medium diffiulty. $39.95. Infocom, 125 CambridgePark Dr., Cambridge, MA 02140. CP (Jan 88)

Portal is an intriguing science fiction novel for kids that suffers from having a poor interface. Storyline: All of humanity is missing and you have to search through a database for files that reveal the mystery. Nothing in the way of role-playing, and the Mac version is slow and buggy. $49.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. CP (Oct 87)

Puppy Love is a combined game and teaching tool. As you teach your puppy tricks and routines, you learn the basics of programming logic. Great fun for all ages. Does not run from a hard disk. $29.95. Addison-Wesley, Route 128, Reading, MA 01867. CP (Mar 87)

Quarterstaff (v. 1.2) is a fantasy adventure game of the typical "good vs. evil" variety. Ability to use characters in other adventures gives this game a lot of potential for development. Requires 1M+. $49.95. Simulated Environment Systems, 800 South Pacific Coast Hwy., Redondo Beach, CA 90277. NCP (Mar 88)

Seven Cities of Gold is an educational program masquerading as an adventure game and is practically unique in being equally good in both respects. You are to land (not the easiest part) in the New World and attempt to placate the natives, seed a few missions and collect gold. Nice work if you can get it.

MINIFINDERS 

$39.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. CP (Jun 87)

Shadowgate is an icon-based graphic adventure. You, as the seed ★★★★½ of prophecy, must save the world from the evil warlock. Far surpasses all others with great animated graphics, sound, and adventure. $49.95. Mindscape, 3444 Dundee Rd., Northbrook, IL 60062. CP (Dec 87)

Shanghai challenges players to clear a board of all 144 tiles by ★★★★★ matching pairs of mah-jongg tiles and removing them. Terrific strategic options plus the ability to randomly generate new game boards keep this one fresh. $44.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. CP (Nov 86) ★'86 Eddy

Skyfox is a sophisticated 3D shoot-em-up. You're fighting tanks, ★★★ planes and enemy cities floating in the sky. Fast graphics, good sound, slick, on-board attack computer and many levels of difficulty will keep fans of this genre happy for hours. $39.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. CP (Oct 86)

Smash Hit Racquetball is an accurate and entertaining simulation ★★★★½ of a day on the courts. Digitized sound adds to the realism. Includes a hard-disk install, unusual for a game. The low price makes this the perfect Mac gift. $19.95. Primera Software, 650 Cragmont Ave., Berkeley, CA 94707. CP (Dec 86)

Snake-Bar lets you guide a snake (or train or semi) through a maze, ★★★★ picking up objects that feed and make your snake grow. Options include changing languages, editing the maze, and an X-rated game. $15. (shareware). Georges Malmound, 37 Bis rue des Abbesses, Montmartre, 75018 Paris, France. NCP (Dec 87)

Solitaire Royale is a collection of eight solitaire card games. The ★★★★ Tour mode cycles through each game. Tournament deals the same hand for several players. $34.95. Published by Spectrum Holobyte, 2061 Challenger Dr., Alameda CA 94501. CP (May 88)

Space Quest is a three-dimensional, animated adventure in which ★★★★ you play a janitor in a dicey situation. All you have to do is get off your ship before it explodes and save the Earnon System. Runs on any Mac. $49.95. Sierra On-Lin, PO Box 485, Coarsegold, CA 93614. CP (Sep 87)

Star Fleet I: The War Begins! is a space opera of the *Star Trek* ★★★★ variety. Rise through the ranks from ensign to admiral in this serialized adventure. Requires 512K+. $55. Interstel, PO Box 57825, Webster, TX 77598. NCP (May 88)

Stationfall is the sequel (finally) to Infocom's excellent *Planetfall* ★★★★½ text adventure. Reunited with Floyd and sent to pick up requisition forms, you must solve the empty space station problem. As straightforward as other Infcom games; more so than some. $39.95. Infocom, 125 CambridgePark Dr., Cambridge, MA 02140. NCP (Nov 87)

Strategic Conquest Plus challenges you to discover an unexplored ★★★★½ world and conquer it by manufacturing and deploying armies, ships, and planes. A two-disk game that doesn't support an external drive. Requires 512K+. $59.95. PBI Software, 1111 Triton Dr., Foster City, CA 94404. CP (Feb 88)

Sub Battle Simulator is a superior naval combat game. Sixty differ- ★★★★ ent missions and the ability to link missions keep it from ever getting boring. Requires 512K+. $39.95. Epyx, PO Box 8020, Redwood City, CA 94063. NCP (Aug 87)

Tass Times in Tone Town is a slightly off-the-wall graphic adven- ★★★½ ture in which you need a flashy hairdo and a jumpsuit before you can get anywhere, and you pay for things with guitar picks. Decent puzzles, with a sense of humor. $4.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. CP (Jan 87)

The Toy Shop is a construction kit for building 20 different working ★★★★ model toys. Some parts can be customized. Manual gives clear instructions, but many toys are too complex for a child. $49.95. Broderbund, 17 Paul Dr., San Rafael, CA 94903. CP (Nov 86)

Trust & Betrayal: The Legacy of Siboot requires negotiating with ★★★★½ 6 artificial personalities in a struggle for power — not surprising considering that it comes from the maker of *Balance of Power.* Uses hieroglyphics to communicate in a fantasy world. Requires 512K+. Mindscape, 3444 Dundee Rd., Northbrook, IL 60062. CP (Mar 88)

Ultima III allows up to four characters to cooperate to explore the ★★★★½ vast wilderness of Sosaria. $59.95. Origin Systems, 340 Harvey Rd., Manchester, NH 03103. CP

Uninvited is an icon-based adventure game set in an extremely ★★★★★ haunted mansion. Since you access the parser by double-clicking, command choices are always visible — you don't waste time trying to figure out which words the program understands. It has animation and sound. $49.95. Mindscape, 3444 Dundee, Northbrook, IL 60062. CP (Sep 86) ★'86 Eddy

Winter Games lets up to eight players compete against each other ★★★★ in Olympic events including figure skating, bob sledding, biathlon, and ski-jumping. Excellent animation, good graphics, good theme music. $39.95. Epyx, 600 Galveston Dr., PO Box 8020, Redwood City, CA 94063. CP (Mar 86)

Wizardry is an outstanding dungeon exploration adventure pitting a ★★★★★ party of up to six characters against the guardian monsters of the evil wizard Werdna. Capture his amulet to earn your reward. Even after solving the game, you'll want to go back into the dungeon. $59.95. Sir-Tech, Charlestown-Ogdensburg Mall, PO Box 245, Ogdensburg, NY 13669. CP

WordPlay is a word game with over 50 crossword puzzles for differ- ★★★★ ent levels of expertise. User friendly, it offers on-screen Help menus. A Work mode allows development of new puzzles for the creative. $49.95. Palantir, 12777 Jones Rd., Houston, TX 77070. NCP (Mar 86)

World Builder is an adventure game construction set with what ★★★★½ amounts to its own programming language. The whole program (language included) is easy to learn and produces commercial quality games. No support for the programming language, though. $79.95. Silicon Beach, PO Box 261430, San Diego, CA 92126. NCP (Apr 87)

Xyphus is a role-playing game pitting four characters (fighters or ★★★★ wizards) against multiple scenarios that grow increasingly harder. Excellent Mac interface and icon control. $39.95. Penguin, PO Box 311, Geneva, IL 60134. CP

Your Personal Poet creates personalized greeting cards on the ★★★½ Mac. Comes complete with four greeting cards and matching envelopes. Requires 512K+. $29.95. Computer Poet, 775 E. Greg St., Sparks, NV 89431. NCP (Jun 87)

Zork II is where the adventure continues in the underground em- ★★★★½ pire. A wandering wizard keeps things interesting, though there's a way to beat him if you persevere. $44.95. Infocom, 125 CambridgePark Dr., Cambridge, MA 02140. NCP

Zork III is the final chapter in the trilogy. Players come up against the ★★★ ultimate enemy — the Dungeonmaster himself. More closed-ended than previous *Zorks.* $44.95. Infocom, 125 CambridgePark Dr., Cambridge, MA 02140. NCP

MUSIC

Apple MIDI Interface is a simple Musical Instrument Digital Inter- ★★★ face with a 1 MHZ clock rate. Has only one MIDI input and one output. Works with all Macs; adaptor required for 128K and 512K. $99. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (Jun 88)

ConcertWare+ is an enhanced version of *ConcertWare.* Has differ- ★★★★ ent instruments and can use any four of a set of eight at any point in a piece. Supports Adobe Sonata music font.

MINIFINDERS



\$69.95. Great Wave Software, 5353 Scotts Valley Dr., Scotts Valley, CA 95066. NCP (Dec 87) ★'85 Eddy

ConcertWare+MIDI is a composition and transcription program ♟♟♟♟ that can record multiple notes from a MIDI keyboard. Easy to use if you read music. Handles 8 tracks of 8 voices each. Requires 512K. Version 4.0. \$149.95. Great Wave Software, 5353 Scotts Valley Dr., Scotts Valley, CA 95066. NCP (Dec 87)

Deluxe Music Construction Set lets you enter up to 48 voices on ♟♟♟♟ eight staves, and play the music through the Mac's internal speaker and/or via MIDI. Requires 512K+. Mac II and *MultiFinder* hostile. Version 2.0 reviewed. \$99.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. CP (Jun 88)

Jam Factory is a program for performing complex manipulations on ♟♟♟ MIDI data in real time. Unique, entertaining, and very powerful, but requires lots of patience and practice. Requires 512K+, MIDI interface, and MIDI synthesizer. \$189. Intelligent Computer Music Systems, PO Box 8748, Albany, NY 12208. CP (Oct 87)

Jam Session is a music program for those who think MIDI refers to ♟♟♟♟ the length of skirts. Without any skill, you can "Jam" with rock, jazz, rap, or country tunes. A sort of "Sing Along With Mitch" for the computer set. Requires 512K+. \$49.95. Broderbund, 17 Paul Drive, San Rafael, CA 94903. CP (Jul 88)

Listen is an educational tool for ear training. It has both a piano ♟♟♟♟ keyboard and a guitar fretboard for the student to input notes, and offers a wide range of exercises. \$99. Resonate, PO Box 996, Menlo Park, CA 94026. (Jan 87)

M is a music composition and creation program that works with MIDI ♟♟♟ data in real time. Unique, entertaining, and very powerful, but requires lots of patience and practice. Requires 512K+, MIDI interface, and MIDI synthesizer. \$219. Intelligent Computer Music Systems, PO Box 8748, Albany, NY 12208. CP (Oct 87)

Master Tracks Pro is a full-featured, second-generation MIDI se- ♟♟♟♟½ quencer that adheres to the Mac interface very well. It's the first program to have graphic controller editing. Needs patch chasing for professional use, but it's still a rock-solid program. \$350. Passport Designs, 625 Miramontes St., #103, Half Moon Bay, CA 94019. CP (Dec 87)

MIDIBasic is a simple, but highly useful routine for writing MIDI ♟♟♟♟ software. Good stuff. Sketchy documentation. Works with both *Microsoft* and *ZBasic*. Requires 512K+ plus Basic. \$49.95. Altech Systems, 831 Kings Hwy, Shreveport, LA 71119. NCP (Aug 87)

Music Mouse is a music program in a genre all its own. Called an ♟♟♟♟♟ "intelligent instrument," *Music Mouse* gives you instant musical feedback as you move the mouse and type on the keyboard, which controls tempo, vibrato, volume, etc. \$59.95. OpCode Systems, 444 Ramona St., Palo Alto, CA 94301. NCP (May 87)

Performer (v. 2.2) is the definitive MIDI sequencer, and is priced ♟♟♟♟ accordingly. Includes looping, SMPTE synching, 32 simultaneous Ins and Outs, unlimited overdubbing, and compatibility with *Professional Composer* for transription. Requires MIDI interface and 512K+. \$395. Mark of the Unicorn, 222 Third St., Cambridge, MA 02142. CP (Jan 88)

Professional Composer produces performance-quality sheet mu- ♟♟♟½ sic using Adobe's Sonata font. Scores can be created from scratch or imported from *Performer* (and can be exported to *Performer* for MIDI playback). Requires 512K+. \$495. Mark of the Unicorn, 222 Third St., Cambridge, MA 02142. CP (Jan 88)

Studio Session consists of two programs, an Editor, and a Player, ♟♟♟♟½ that produce music with six voices of digitized sound. Excellent program plus good manual make this a good buy. \$89.95. Bogas Productions, PO Box 6699, Terra Lina, CA 94903-0699. NCP (Aug 87) ★'86 Eddy

UpBeat turns the Macintosh into a front panel for a highly complex ♟♟♟½ and versatile drum machine. Input patterns with mouse, MIDI keyboard, or drum machine. Requires 512K. \$150. Intelligent Music, PO Box 8748, Albany, NY 12208. CP (May 88)

HARDWARE & ACCESSORIES

AST TurboScan is a 300 dpi scanner with sophisticated graphics ♟♟♟♟ software. Scans at resolutions from 72 to 300 dpi. *SuperScan* software offers halftone, line art, and mixed modes. "Virtual memory processing" lets you scan images too large to fit in RAM. \$1899. AST Research, 2121 Alton Ave., Irvine, CA 92714. Requires 512K+. *SuperScan* software included. NCP (Nov 87)

Classic Professional Graphics Display is a low-cost color monitor ♟♟♟½ for the Mac II. Good value, but has an IBM-look about it. Green tint is annoying. Requires Apple video card. \$549. Classic Components, 1490 Artesia Blvd., Gardena, CA 90247 (Jun 88)

CMS S-140 SCSI Hard Disk is a very fast, high-capacity SCSI hard ♟♟♟♟♟ disk with a unity interleave and average access time of 18 msec. Holds 140M. Help, file transfer, and tape back-up commands built in. *Hard Disk Partition* is a useful DA. Comes with a 6 ft. SCSI cable. \$2995. CMS Enhancements, 1372 Valencia Ave., Tustin, CA 92680. (Jul 87)

DASCH is an external RAMdisk available in half, 1, and 2M sizes. ♟♟♟ Connects to a serial port. Speeds up operations 200 to 300%. Can be used as a printer buffer. Works with all Macs. 512K, \$395; 1M, \$450; 2M, \$545. Western Automation-Laboratories, PO Box 3438, Boulder, CO 80307. (Feb 87)

Data Frame 40XP is a very fast, very quiet 40-meg external SCSI ♟♟♟♟ hard drive. Comes with a good and complete set of utility software. About as fast as a SCSI drive can be. Requires SCSI port, 512K+, new ROM. \$1899. SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043.

DaynaFile hooks up to a SCSI drive to read MS-DOS disks in the ♟♟♟♟ Mac environment. Use Mac applications to manipulate data created with an IBM PC. Comes in both 5-¼ and 3-½ inch formats. \$595 for single floppy. Dayna Communications, 50 S. Main St., 5th Floor, Salt Lake City, UT 84144. (Jan 88) ★'87 Eddy

FX-20 is a good 20-meg external hard drive. Good utility software. ♟♟♟♟ Reliable and reasonably quiet. Sits next to Mac, has a large, oddly shaped case. Requires SCSI port, 512K+, new ROM. \$1199. General Computer, 215 First St., Cambridge, MA 02142. (Feb 87)

Hard Disk 20SC is Apple's 20-meg SCSI hard disk. Reliable, fairly ♟♟♟♟ noisy unit. Good utility software, but no back-up yet. Requires cable and terminator (\$80). Requires SCSI port, 512K+, new ROM. \$1299. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (Feb 87)

Hewlett-Packard ColorPro Graphics Plotter is an eight-pen desk- ♟♟♟ top plotter that requires third party software to drive it. Fonts are limited to an optional Graphics Enhancement Cartridge that requires some BASIC programming. \$1295. Hewlett-Packard, 16399 W. Bernardo Dr., San Diego, CA 92127. (Feb 88)

ImageMaker shoots 35mm color slides direct from the Mac. Sup- ♟♟♟♟ ports most presentation software. Uses patterns to represent colors. Not fully compatible with the Mac II. Requires 512K+. \$4995. *MacDriver* software, \$149. Presentation Technologies, 743 North Pastoria Ave., Sunnyvale, CA 94086. (Feb 88)

IS/ONE tablet with **Penworks** software lets you use a corded or ♟♟♟½ cordless pen or mouse and a high-res tablet for precise graphics input. Minor bugs with some applications and DAs. Keystroke macros can be launched from the tablet. Minimal

MINIFINDERS

documentation. Requires 1M+. $595 to $1145. Kurta, 4610 S. 35th St., Phoenix, AZ 85040. (Jan 88)

Jasmine Direct Drive 50 is a very quiet 1:1 interleave 50 megabyte ♦♦♦♦♦ hard drive and one of the fastest SCSI drives around. A small fan keeps it cool, but it's still quiet. $1159. Jasmine Technologies, 555 De Haro St., San Fransisco, CA 94107. (Mar 88) ★'87 Eddy

LaserWriter II NT is Apple's mid-priced PostScript laser printer. It's ♦♦♦ faster than the LaserWriter Plus, with blacker blacks. Gray scale is less even than that of Plus. Requires 512K+. $4599. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (May 88)

Laser Writer II NTX is Apple's top-of-the-line PostScript laser print- ♦♦♦♦½ er. 68020 chip makes it very speedy; expandable to 12M; SCSI hard disk can be attached for fonts. Requires 512K+. $6599. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (May 88)

LaserWriter II SC is Apples's low-end QuickDraw laserprinter. Can ♦♦♦ be upgraded to NT or NTX; reasonably fast. Requires 1M+. $2799. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (May 88)

MacADIOS II is a hardware and software interface for laboratory ♦♦♦♦ instruments. Standard configuration samples up to 142 kHz. Documentation is sketchy. $1290 for Macintosh II-ready data acuisition card; $600 for MacADIOS II software interface. GW Instruments, 264 Msgr. O'Brien Hwy., Cambridge MA 02141. (Jul 88)

MacBottom 45 SCSI and Internal Modem has a modem that fits ♦♦♦♦½ into the top half of the 45-megabyte SCSI hard drive case. Comes with *HFS Backup* and *Eureka*. $1795. PCPC, 4710 Eisenhower Blvd., Tampa, 33634.(Oct 87)

MacBottom HD21 is a very low (about 2 inches high), external 20- ♦♦♦♦♦ meg hard drive. Fits under the Mac. Very quiet, very reliable. Good utility software, including *HFS Backup*. Requires SCSI port, 512K+, new ROM. $1195. PCPC, 4710 Eisenhower Blvd., Tampa, 33634. (Feb 87) ★'86 Eddy

MacCharlie's components slip around the Mac and convert it into ♦♦♦♦ an IBM PC clone. Amazingly, it works well. The enlarged keyboard has a few bugs but is a joy to use. $995. Dayna Communications, 50 S. Main St., Salt Lake City, UT 84144. (Dec 85)

Macintizer is a graphics tablet and absolute positioning device that ♦♦♦♦ replaces the mouse. Various scales are possible. $599. GTCO Corp., 7125 Riverwood Dr., Columbia, MD 21046.

MacLarger is a 12-inch external monitor for 512K machines on up ♦♦♦ to the SE. Displays the same number of pixels as an internal monitor, only one-third larger. Bigger and brighter, but less crisp than the Mac's own screen. $449. Power R, 1606 Dexter Ave. North, Seattle, WA 98109. (Apr 88)

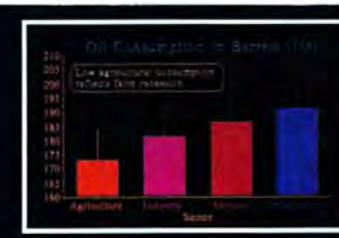
MacPacq transforms the Macintosh into a digital oscilloscope, ♦♦♦ waveform generator, and chart recorder. *PacqManager* software expandable via external routines in *Turbo Pascal* and other languages. Version 1.03 reviewed. $995. Biopac Systems, 42 Aero Camino, Goleta CA 93117. NCP (Jul 88)

MacRecorder is an easy-to-use sound digitizer. Includes software ♦♦♦♦½ to turn sounds into *HyperCard* buttons, mix sounds, add special effects, and convert sound formats. Stereo recording possible on a Mac II. Requires 512K+. $199, Farallon

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Computing, 2150 Kittredge St., Berkeley, CA 94704. NCP (Jun 88)

MacSnap Plus 2 is a 2M memory upgrade for the Mac Plus. The ★★★★ board has 256 kilobit chips. User installable. Not compatible with existing big screens or internal hard disks, and can't be expanded further. $399. Dove Computer, 1200 North 23rd St., Wilmington, NC 28405. (Jun 87)

MacTable is an elegant Danish worktable that holds a Mac and ★★★★½ printer with room to spare. The 30-inch deep by 60-inch wide table is made of particleboard and must be assembled. Cabinet is optional. Table, $289; cabinet, $139. ScanCo-Furn, PO Box 3217, Redmond, WA 98073-3217. (Mar 88)

MacTablet is a stylus-driven graphics tablet. Users can easi- ★★★★ ly sketch or trace art using this absolute-positioning device. Has a working area the size of the Mac screen. Allows concurrent use of the mouse. $495. Summagraphics Corp., 777 State St. Extension, Fairfield, CT 06430. (Jan 86)

MacTilt/MacTilt SE is a Mac (and external drive) holder that allows ★★★★ a full range of swiveling and tilting. Very strong, this well-made unit is also very easy-to-use. $99.95. Ergotron, PO Box 17013, Minneapolis, MN 55418.

MacVision is a digitizer that uses an ordinary video camera for ★★★★ input. Capable of extremely fine results and special effects. Easy to use and well-documented. $349.95. Koala, 269 Mt. Hermon Rd., Scotts Valley, CA 95066.

Mac-101 is a keyboard alternative that has a good feel to it. Has a ★★★★ keypad, 15 function keys, and more. The *101-Keys* desk accessory lets you define macros. Comes in an ADB version for the SE and II. Requires 512K+. $169.95. DataDesk International, 7650 Haskell Ave., Van Nuys, Ca 91406. Software NCP (Apr 88)

Magic Digitizer is a hardware digitizer that works with video cam- ★★★★ eras. With *LaserMagic* software you can generate 300 dpi images (in PostScript). Requires 512K+. Digitizer with *Magic* software, $399.95; *LaserMagic* software, $49.95. New Image Technology, 10300 Greenbelt Rd., Seabrook, MD 20706. NCP (May 87)

Microtek MSF-300C is a 300-dpi flatbed scanner. Really fast when ★★★½ used with optional MS-SCSI/C adapter. Comes with *VersaScan Plus* software (NCP) to scan and manipulate image. Saves images in a number of formats including TIFF and *MacPaint*. $1895. Microtek Lab, 16901 S. Western Ave., Gardena, CA 90247. (Dec 87)

Migent Pocket Modem is a 300/1200 baud portable modem ★★★½ about the size of a 3 X 5 index card. Comes bundled with *MacTerm* 2.0, Borland's telecom DA. Manual is confusing, and tech support is minimal. $259. Migent, 865 Tahoe Blvd., Incline Village, NV 89450-6062. (Nov 87)

Mouse Mover is a mouse pad-type surface that snaps onto the ★★★★½ bottom of the mouse like a roller skate, freeing it up to glide over desk or mouse pad with ease. 99 tiny ball bearings at three strategic points. Mouse glides faster and saves on mouse wear and tear. $19.95. Magnum Software, 21115 Devonshire St., Chatsworth, CA 91311. ★'85 Eddy

Moustrak is a fabric covered foam mousing pad. It will increase the ★★★★ efficiency of your mouse while helping to keep it clean. Pad comes in a variety of colors. Particularly useful in the typical

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MINIFINDERS



office desktop environment. $10. Moustrak, 3047 St. Helena Hwy., St. Helena, CA 94574.

NetModem is a 1200-baud modem that can be accessed by all users on an AppleTalk network. The modem's display lights and the dial tone are simulated on screen. Requires 512K+. $599. Shiva, Suite 1200, 222 Third St., Cambridge, MA 02142-9919. (Feb 88)

NoLabelSystem is a plastic permanent labeling system in which users slide new tabs into a transparent plastic case on the disk. The tabs stick out of the case slightly, making them easier to read while in the drive. $19.45. Weber & Sons, 3468 Hwy. 9, Freehold, NJ 07728.

One Plus One is a user-installable memory upgrade for a Mac Plus. Adds 1 megabyte of RAM to the 1M already there. Simple one-evening project. Includes MacBreeze, an excellent small fan. Requires Mac Plus. $375. Levco, 6160 Lusk Blvd., San Diego, CA 92121. (Aug 87)

Personal LaserPrinter is a non-PostScript laser printer at a great price. Clumsy workarounds required in some applications. Printing can be slow. Requires 1M+. $1999; Fonts Plus, $299. General Computer, 580 Winter St., Waltham, MA 02154. (Apr 88)

Personal Writer PW15 S is a tablet-based handwriting recognition system that also allows graphics and macros. Number of misread characters is too high for general word processing. Requires 1M+. $895. Personal Writer, 1801 Ave. of the Stars, Los Angeles, CA 90067. Software NCP (Mar 88)

PhoneNET is an AppleTalk-compatible network. Network can be up to 3000 ft in length. In-place, unused phone cabling can be used for network, and can be combined with AppleTalk on same network. $49 per node. Farallon Computing, 2150 Kittredge St., Berkeley, CA 94704. (Dec 86) ★'87 Eddy

QMS-PS 810 is an 8-page-per-minute, 300 dpi PostScript laser printer that competes with the LaserWriter NT. 2MB of RAM is standard; upgradable to 3MB. Emulates HP LaserJet, 7475 (HPGL), and Diablo 630. $5495. Laser Connection, 7852 Schillinger Park West, Mobile, AL 36608 (Jul 88)

QuickShare adds a SCSI port to an IBM PC for easy connectivity with a Mac. Can use an IBM's hard disk to run Mac applications. Requires SCSI port. Mac II and *MultiFinder* friendly. Version 1.24 reviewed. $465. Compatible Systems, P.O. Drawer 17220, Boulder, CO 80308. (Jun 88)

SuperRam 2 and SuperRam 4 are 2- and 4-megabyte RAM upgrades. Should be dealer installed but can be (carefully) user installed. SuperRam 2 includes RAM adaptor module, 1-meg memory module, modified power cable, jumper and fan. SuperRam 4 adds power supply booster and two 1-meg memory modules. Not compatible with most big screens. $499. SuperMac Technology, 295 N. Bernardo, Mountain View, CA 94043. (Oct 87)

ThunderScan replaces the ribbon cartridge in an ImageWriter, which is required to use it. Laser scans art that can be run through the ImageWriter, producing high-quality digitized images. The images can be manipulated as they are created or afterward. $249. Thunderware, 21 Orinda Way, Orinda, CA 94563. ★'85 Eddy

TimeWand is a bar-code reader with a built-in time/date stamping clock. Can be used with *TimeWand Manager* software, a database that's extensive though difficult to use. Poor docs, but good support. Requires 1M+. *TimeWand* 2K version, $198; *TimeWand Manager,* $489. Videx, 1105 NE Circle Blvd., Corvallis, OR 97330-4285. (Dec 87)

TV Producer is an add-in card that overlays Mac graphics and text onto a video signal. Software is clumsy to use. Requires Mac II, Apple video card, and video source. $599. Computer Friends, 14250 NW Science Park Dr., Portland, OR 97229. Software NCP (May 88)

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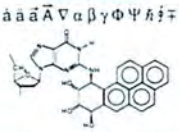
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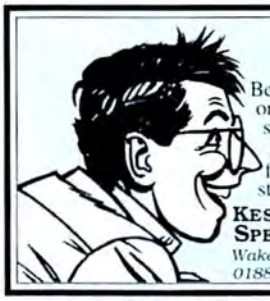
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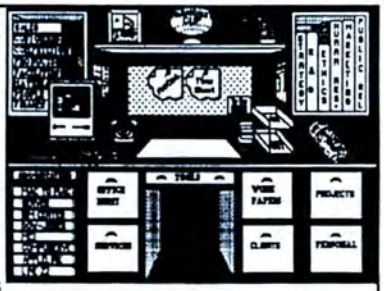
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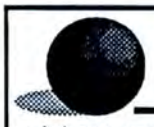
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by John C. Dvorak

Armageddon '88

Watching masses of people scramble is an amusing pursuit. I used to get on top of the Wells Fargo building on Bancroft (across the street from the student union building at the University of California, Berkeley) during the riotous 60s and watch the police and crowd do battle. I imagined that that must have been what a Roman war looked like.

During that period of my life, I discovered an interesting phenomenon about crowds. When they start to run to or from something, they move like stampeding buffalo. A herd. I learned that when you're in a crowd and all of a sudden it gets ugly and panicky, the first thing you do is find an immovable object such as a 200-year-old oak tree and quickly scramble to the tree and get behind it and let the crowd swarm past you like fluid.

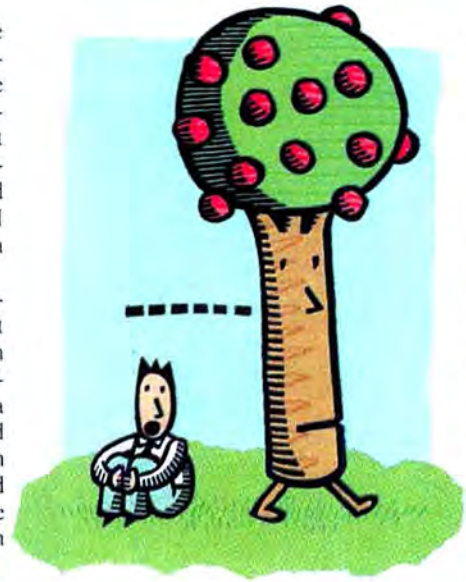
In this industry, there are no immovable objects to stand behind. The best you can do is watch from the top of the building if you don't want to get trampled.

And a lot of people will be crushed in the latest screwball turn of events. Apple has sued Microsoft! Sued because of the look and feel of the latest *Windows* release.

Suddenly Apple is the bad guy. Developers who worked on Mac applications and hadn't made billions of dollars used to zoom their BMWs up and down Interstate 280, thinking up ways to take their code to the IBM arena, where they hoped *Windows* would afford them an easy transition. Dreams of the BMW V-12 750il flew around in their collective heads.

Now this! Boy, did Apple screw things up for everyone. Let's find John Sculley and throw him into San Francisco Bay!

Not good enough? Then what Apple should do is take all its patents and copyrights and make them all public domain! Apple should give the source code to the ROM to Radio Shack and the schematics of the machines to the Taiwanese and say, "Here. Go for it. It's yours." Furthermore, it should take all the treasury stock and turn it into certificates and send it to Boca Raton, addressed TO WHOM IT MAY CONCERN and attached to a memo saying, "Keep it." Sculley should then give his wife to some white slavers in Libya and



donate his house to the homeless who roam the San Francisco streets. Finally he should start a shareware software company. I wonder if all that will make the complainers happy. Probably not.

To me all the complaining about Apple's trying to protect its inventions is the kind of hypocritical and pathetic whining that I can always expect from the Mac community. And let's not talk about how the interface belongs to Xerox. We all know that Microsoft, Apple, and even Sun Microsystems have licenses with Xerox. Apple has gone far beyond the Xerox product. So forget all that stolen-interface nonsense.

The fact is that Bill Gates, in 1985, got wind of a potential suit from Apple over *Windows* and intimidated Sculley into signing a document that turned over patents and licenses to Microsoft in 1985. I think he may as well have offered Sculley a revolver.

Gates told Sculley he'd stop all Mac development if Sculley sued over the interface. Sculley, a rube at the time, was being taught a lesson by the wily Gates. Sculley figured he had little choice but to sign it's pretty clear to anyone who looks at this case.

1988: Sculley doesn't need Gates anymore, and he sees Gates as siding more and more with IBM and out to destroy the Mac with a cheap imitation of the Mac interface. So Sculley looks for a way out of the secret agreement with Gates and finds a cozy courtroom.

All the Mac developers who hoped to move their applications to the cheap imitation in hopes of making an unholy killing are now moaning about all this. Some say they'll never work with Apple again.

Right. Hail, IBM. When has it done anyone a favor? The new PS/2 microchannel is protected by licenses and copyrights and undocumented pinouts. Quote from *Computer Systems News:* "IBM has threatened to sue any companies that directly copy its patented architecture, but has also said it will grant utility licenses to vendors whose designs may reproduce the functionality of the IBM. However, by not revealing which parts of the PS/2 are pending patents and by not issuing any utility patent licenses, IBM has been able to keep clone vendors on the defensive."

So IBM is better than Apple? Sounds like the same game to me. In the middle is Microsoft, trying to make as much money as it can. In the case of *Windows*, it is nothing more than a Paperback Software or any other vendor of a copycat program. At least Paperback Software's 1-2-3 clone is nearly as good as Lotus' original. I can't say the same for *Windows*.

Apple developers should be ashamed of themselves for considering a move to IBM. It's a desire driven by greed and greed alone. They see the IBMers as suckers in the first place. So let's fleece them! What an attitude. Apple, meanwhile, wants the developers to stay put and improve the Mac products. Stay with the job. First things first and all that nonsense. Do you blame Apple for this sentiment? What choice does the company have? If Sculley took any other tack, then I'd say he should be ousted.

Apple users all know that the *Windows* program of the Microsoft/IBM axis is no substitute for the Mac OS. But the public sees it as a similar interface and may go either way. Maybe quality will win out; maybe it won't. Who wants to take a chance when IBM is involved? This suit was one smart move. Kudos to Apple. Darts to the detractors.

ROBERT ZIMMERMAN

The biggest difference* between the new WriteNow 2.0 and our competition *may not* be in the chart below.



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Spelling Checker Size	**100,000 words**	100,000 words	80,000 words	80,000 words
Font size range	**4-127 pts.**	7-24 pts.	7-72 pts.	2-127 pts.
Usable font sizes	**124**	7	11	126
Number of open documents	**Unlimited†**	1	30	30
Editable columns on-screen (WYSIWYG)	**4**	1	1	1
Mail merge	**Yes**	No	No	Yes
On-screen auto-numbering footnotes	**Yes**	No	No	No
Automatic repagination	**Yes**	Yes	No	No
Graphics in same line as text	**Yes**	No	Yes	Yes
Multiple headers and footers	**Yes**	No	No	No
Extensive Undo	**Yes**	No	No	No
Select All command	**Yes**	Yes	No	No
Variable line spacing in points	**Yes**	No	No	Yes
Selective font, size, style, and ruler changes	**Yes**	No	No	Yes
Search for a word	**2.4 sec**	7.6 sec	9.5 sec	9.7 sec
Spell Check document	**6.3 sec**	2 min 34.0 sec	2 min 2.3 sec	1 min 48.0 sec
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Change fontsize of document	**10.7 sec**	50.2 sec	17.6 sec	16.2 sec
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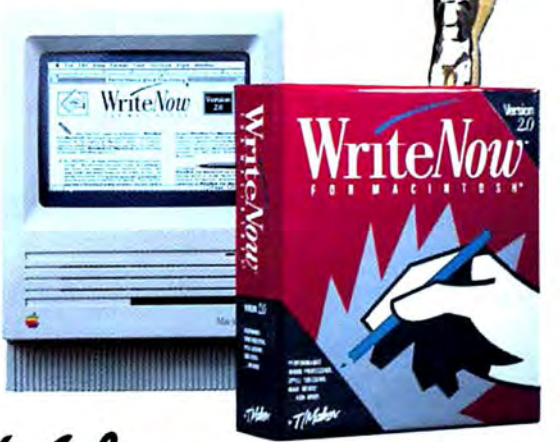
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